AD-A134 296 E/O (ELECTROOOPTICAL) AUGMENTATION ENVIRONMENTAL TEMPERATURE TEST(U) MARTIN MARIETTA AEROSPACE ORLANDO FL A PAPKE SEP 83 OR-17385 DAAK50-82-G-0002 1/3

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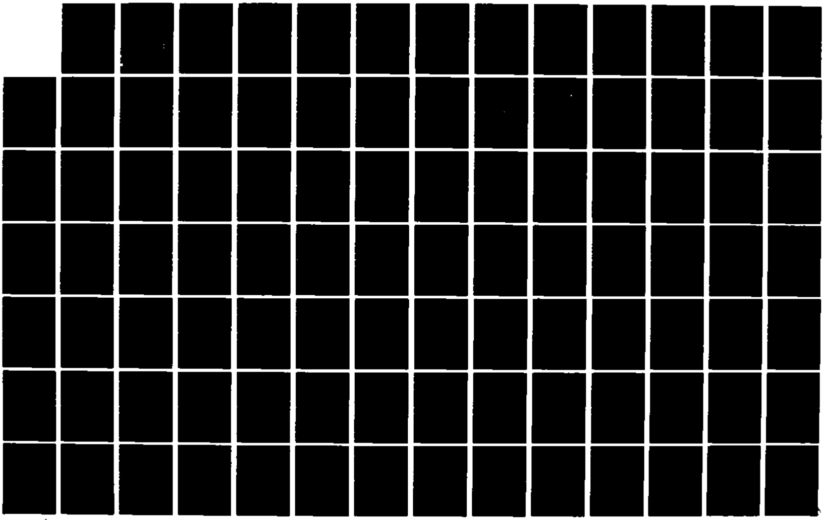

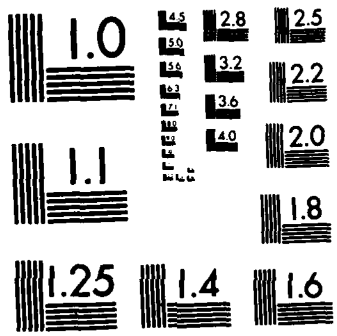

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AD-A134 296

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E/O AUGMENTATION ENVIRONMENTAL

Temperature Test

OR 17,385 September 1983

MARTIN MARIETTA AEROSPACE
Post Office Box 5837
Orlando, Florida 32855

Approved by: R. J. Straiton

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SECURITY CLASSIFICATION OF THIS PAGE (*When Data Entered*)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER OR 17,385	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (*and Subtitle*) E/O Augmentation Environmental Temperature Test		5. TYPE OF REPORT & PERIOD COVERED Final Report
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Al Papke		8. CONTRACT OR GRANT NUMBER(s) DAAK50-82-G-0002
9. PERFORMING ORGANIZATION NAME AND ADDRESS Martin Marietta Aerospace PO Box 5837 Orlando, Florida 32855		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Office of the Project Manager, TADS/PNVS 4300 Goodfellow Blvd. St. Louis, MO 63120		12. REPORT DATE September 1983
		13. NUMBER OF PAGES 235
14. MONITORING AGENCY NAME & ADDRESS (*if different from Controlling Office*) Same		15. SECURITY CLASS. (*of this report*) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (*of this Report*)

No limitation on distribution.

17. DISTRIBUTION STATEMENT (*of the abstract entered in Block 20, if different from Report*)

18. SUPPLEMENTARY NOTES

None.

19. KEY WORDS (*Continue on reverse side if necessary and identify by block number*)

Electro-Optical; Performance vs. Temperature Extremes; Testing

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Determine performance characteristics of the electro-optical automatic test equipment (ATE) at the operating temperature extremes of 65 degrees F and 90 degrees F. The most significant fact determined during testing was that the amount of optical path shifting and focus change experienced during temperature excursion between the two extremes was minimal and well within the capabilities of the built-in compensating adjustment features.

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1. REPORT NUMBER OR 17,385	2. GOVT ACCESSION NO. AD A134 2	3. RECIPIENT'S CATALOG NUMBER 96
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		6. PERFORMING ORG. REPORT NUMBER
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TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

1.1 Purpose:

The purpose of this report is to document the results of the environmental temperature tests performed on the E/O Bench and Electronic Station (E/O Augmentation) which is part of the AH-64 Automatic Test Equipment (ATE). This environemtanl testing will indicate the E/O Augmentations ability to support the AH64 Target Acquisition Designation Sight (TADS)/ Pilot Night Vision System (PNVS) at the required high and low operating temperature extremes, to which it will be exposed in field environment.

1.2 Test Objectives:

The objective of this testing is to perform environmental tests which will generate performance characteristics of the E/O Augmentation at temperature extremes of 65°F and 90°F for engineering evaluation. These temperature extremes represent AVIM operational ambient temperature limits. The tests performed provide an indication as to the ability of the E/O Augmentation to maintain the measurement accuracies necessary to properly evaluate and test the TADS/PNVS LRUs and SRUs.

Specific objectives are:

1. Perform Augmentation Acceptance Test Procedure (ATP) 13082803 at the low temperature extreme.

2. Perform ATP at the high temperature extreme.

3. Determine the amount of temperature induced boresight shift that is present in the Far Infrared Module.

4. Determine the amount of temperature induced focus shift that is present in the Far Infrared Module.

5. Determine the amount of temperature induced alignment shift that is present in VIS/NIR UUT Optical path.

6. Determine the amount of temperature induced focal shifts that are present in the VIS/NIR UUT Optical path.

7. Determine the amount of temperature induced alignment shift of the Visual UUT optical path contained in the Optical Signal Generator (OSG).

8. Determine the amount of temperature induced alignment shifts of the EO MUX Optical path contained in the OSG.

9. Determine the amount of temperature induced focus variations which are present at the visual port of the OSG.

10. Determine the amount of temperature induced focus variations which are present at the EO MUX port of the OSG.

Upon completion of the objectives listed above, Martin Marietta collected the data necessay to perform the required engineering evaluation. The objective of this evaluation was:

1. Evaluate those portions of the ATP which failed either high or low temperature tests.

2. Evaluate data collected during optical testing with respect to overall Augmentation performance.

3. Make recommendations referencing the results of the environmental temperature testing.

1.3 Applicable Documents:

Acceptance Test Procedure Augmentation	-	13082803
Critical Item Development Spec	-	DRC-C-M402003
Electro-Optical Bench	-	13082808-19

2.0 TEST EQUIPMENT

2.1 ATP Test Equipment

Equipment requirements shall be as listed in ATP 13082803, Section 3.3.

2.2 Special Test Equipment

2.2.1 In addition to the equipment listed in Section 2.1 the following special equipment was utilized to measure focus and Boresight sifts of the E/O Augmentation:

1. EZ8-082800A Optical tool
2. EZ8-082787A Optical tool
3. EZ8-082798C Optical tool
4. Video Monitor RCA
5. TOAN 4-6 Collimator
6. I-150 Cuda Fiber Optics Light Source with 36" Fiber Bundle
7. Two .125" x .5" Steel Dowel Pins
8. 2 x 3 Inch Retro-reflector Corner cube
9. 2-6" Flat Granite Parallels
10. K&E Model 71-2030 Autocollimator with angle reading attachment
11. 20x Traveling Microscope with X, Y, and Z travel
12. Temperature chamber capable of enclosing the E/O Augmentation and maintaining 65±3°F, 90±3°F temp. profiles. (See Appendix A-5 for chamber description)
13. Fluke Data Logger 2240C
14. Thermal Couples Type E-7.

2.2.2 The following test equipment was used to characterize the optical tools:

1. Temperature chamber to enclose the optical test tools at 65 ±3°F and 90 ±3°F. See Appendix A-3 for chamber description.
2. Thermotron Thermal Chamber S-1.2.
3. Invar test stand. See sketch - SK001 in Appendix A3 for Stand Description.
4. Kane Mary Temperature Probe EQ728493.
5. Ray Chem. Mini Gun 3, Heat Gun.
6. Air Isolated Optical Table.
7. 20 x traveling microscope with x, y, and z travel.
8. Nikon 6D Autocollimator alignment scope.
9. Fluke Data Logger 2240C.
10. Brunson Model '81' Alignment Scope.
11. D1A Optical Test Stand.
12. Thermal couples Type E-7.

2.3 Optical Tool Characterization

2.3.1 The optical tools determined to have an effect on measurement accuracies were the EZ8-082798C tool, the EZ8-082800A tool and the EZ8-082787A tool.

These optical test tools were temperature characterized with respect to Focus and Boresight shifts over the temperature range of interest. The results of this characterization are shown along with the test setups and procedures in Appendix A-3.

All other test equipment used during the environmental temperature test was determined not to inject any measurement inaccuracies into the test and consequently were not characterized.

3.0 METHOD OF TEST

The test methods employed are a combination of Automatic tests, Manual electro-optical tests, and electro-optical software algorithms.

The Automatic tests consist of the ATP tests which are performed at the test operators keyboard remote terminal, no manual measurements or actions are required, with the exception of prompted commands.

The manual electro-optical tests are those tests which the test engineer is required to perform. The test engineer initialized the E/O Augmentation, attached the required external test equipment, made the appropriate measurements, and recorded the test results. These tests are FIR Boresight and Focus; OSG Boresight and Focus.

Electro-optic Algorithms are those optical tests which are performed from the test operators keyboard remote terminal. The test engineer is required to connect the required external optical stimulus prior to performing each test. Once the tests are initiated, the E/O algorithm is used to provide electronic stimulli, make the necessary measurements and record the data. The results were recorded via computer printout making them available to the test operator. Optical measurements which were performed by computer algorithms are VIS/NIR Focus and Boresight. See Appendix A-4 for the complete listing of the computer algorithms used.

Due to the types of activities which took place during the execution of the temperature testing a specific test order was implemented. In order to not disturb the optical test tool alignments and retain similar mechanical interfaces, the optical test measurements were performed sequentially at the two temprature extremes. This guaranteed all optical test data obtained ws the result of temperature variations of the equipment under test and not due to variations in test setups and mechanical or optical interfaces. To facilitate this, the Augmentation ATP tests were performed at the low temperature profile, followed by the optical tests also performed at low temperature. The optical tests were repeated at the high temprature extreme, followed by the Augmentation ATP which was also performed at the high temperature profile.

3.1 E/O Augmentation Temperatue Test "Test Sequence"

The following represents the order of testing which was observed during the temperature test:

VERIFICATION TESTING

a. Thermal Chamber Evaluation - E/O Augmentation
b. Perform Augmentation ATP at Low Temperature Profile
c. Perform Augmentation ATP at High Temperature Profile
d. Develop and verify Software Algorithms for VIS/NIR Br sight and Focus Tests
e. Tool Characterization Tests
f. Develop test methods for F/R and OSG Optical Evaluat

LOW TEMPERATURE TESTS

a. Twenty-four hour soak at 65 $\pm 3^{\circ}$F
b. Perform Augmentation ATP
c. FIR Module Boresight Test
d. FIR Module Focus Test
e. VIS/NIR Module Boresight Test
f. VIS/NIR Module Focus Test
g. OSG Boresight Test - TV and EO Mux Ports
h. OSG Focus Tests - TV and EO Mux Ports.

HIGH TEMPERATURE TESTS

a. Twelve hour soak at 90 $\pm 3^{\circ}$F
b. FIR Module Boresight Test
c. FIR Module Focus Test
d. VIS/NIR Module Focus Test
e. VIS/NIR Module Focus Test
f. OSG Boresight Test - TV and EO Mux Ports
g. OSG Focus Test - TV and EO Mux Ports
h. Perform Augmentation ATP.

3.2 VIS/NIR Boresight Test

3.2.1 Boresight shifts due to thermal changes in the VIS/NIR collimator module were evaluated by image position shifts. This was accomplished by projecting a crosshair pattern into the VIS/NIR and imaging it on the CID camera. The intersection of the crosshair pattern was established from the camera output. The temperature was changed and the new crosshair position found.

See Figure 3.1.

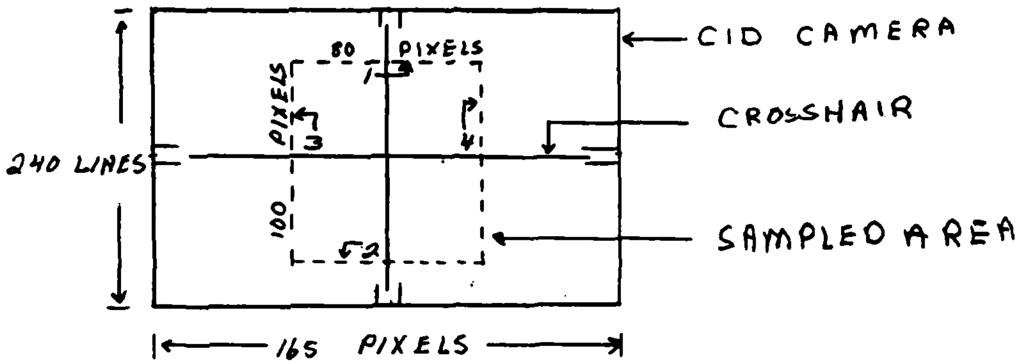
To accomplish this, the "EZ8-082800A A" tool with illuminator is attached to the VIS/NIR mounting assembly. With the aid of a video monitor, the crosshair pattern is focused on the CID camera. The intersection of the crosshair was found by a computer Algorithm which evaluates the CID camera output. The temperature was then varied and the new crosshair position determined.

3.2.2 Boresight Algorithm

The boresight shift of the VIS/NIR collimator was found using relative measurements. The point of intersection of a standard crosshair was calculated at the low temperature then at the high temperature and the differences were compared. This point of intersection was located in the following manner.

The crosshair was positioned as close to the center of the camera's field of view as was possible by using the "A" tool. Data in the center 20% of the camera's field of view was then sampled.

The intersection of the crosshair needed only to lie somewhere near the center of the sampled area.

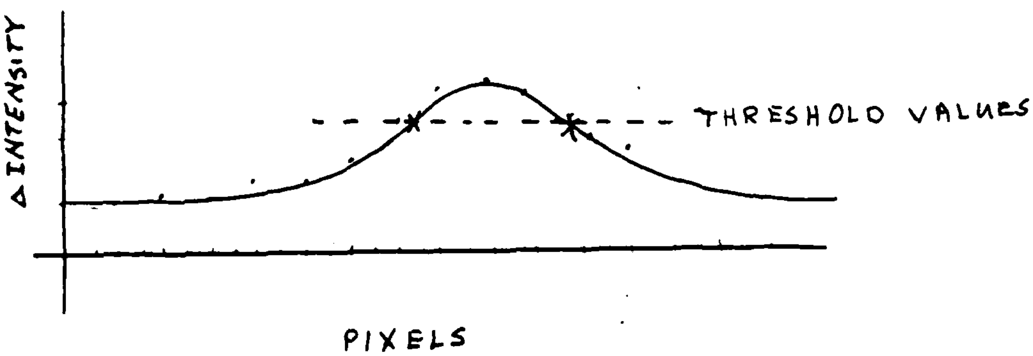


The horizontal lines signified by 1 and 2 are respectively searched from left to right for the location where the vertical part of the crosshair intersects them. Lines 3 and 4 are then respectively searched from top to bottom for the horizontal line of the crosshair.

A snapshot of the sampling area in the center of the camera's field of view is taken and stored in a matrix. The edges of this area are then searched for the point where the leg of the crosshair intersects it. This point is found by detecting changes in light intensity. A black crosshair was projected on to a white field. The CID camera digitizes this data. Totally black objects are equated with the numer 255. White objects are lower numbers depending on intensity and contrast. In our case, a line of digitized data along the edge of the block would resemble the data figure below.

140 143 142 147 152 149 160 184 196 201 194 173 152 149 142 144 141

This could interpolate to a Gaussian line similar to the following:



CID CAMERA OUTPUT
LINE WIDTH

Noise spikes can be detected along the lower ends of the curve. They play a lesser role when an event is occuring, i.e., the crossing of a line.

Due to the small width of the lines composing the crosshair, the digital output never reaches 255 (total black). The relative width of a line depends on where a white to black threshold is established. Once established relative changes in line position can be evaluated. In the boresight program, 180 was used as the white to black threshold. It was a value chosen to keep the effects of noise at a minimum.

The edges of the sample area are searched for a plus crossing (positive slope) and a negative crossing (negative slope) of 180. The distance between these points represents the line width therefore, the point exactly betwen these points would be the center of the line.

When all four sides have been searched, four pairs of coordinates exist. These coordinates are made relative to the lower left corner of the sample area (point [0,0]).

The straight line between the left and right points and the upper and lower points represents the crosshair. The slopes of the two lines are found by the formula:

$$\text{Slope } M = (Y2-Y1)/(X2-X1)$$

Now, the coordinates of two points and the slope of two different lines are known. With this information, the simple formulas shown below can be solved which will give the (X,Y) coordinates of the intersection of two straight lines, i.e., the intersection of the crosshair.

For the vertical lines:

$$Y_1 = (M_1 * X_1) + B_1$$

Where:

Y_1 = Y point on the line
X_1 = X point on the line
M_1 = Slope of the line
B_1 = Zero crossing at axis

Solve for B_1:

$$B_1 = Y_1 - (M_1 * X_1)$$

For the horizontal line:

$$Y_2 = (M_2 * X_2) + B_2$$

Solve for B_2:

$$B_2 = Y_2 - (M_2 * X_2)$$

The intersections coordinates are:

$$X = (B_1 - B_2)/(M_2 - M_1)$$

Plug X into either of the first two formulas and solve for Y:

$$Y = (M_1 * X) + B_1$$
$$Y = (M_2 * X) + B_2$$

(See Appendix A-4 for Algorithm listing)

3.3 VIS/NIR Focus Test

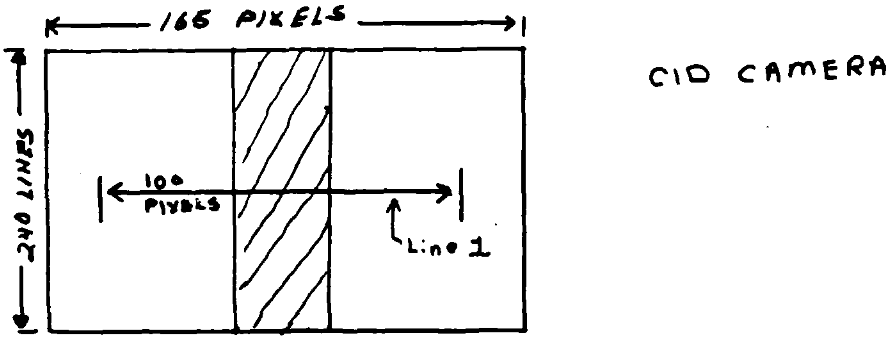
3.3.1 Focus shifts due to thermal changes in the VIS/NIR collimator lenses are evaluated by measuring image size variations. This was accomplished by projecting, from an external collimator, a slit image into the

VIS/NIR collimator. The image was focused onto the CID camera. The slit width is measured, as seen by the camera, at different temperatures. Focus shifts i.e., slit width variations are expected due to the physical characterists of the VIS/NIR lenses. See figure 3.1.

To accomplish this, the TOAN 4-6 collimator with a 13 um slit target was set up externally to the temp chamber. The slit target is illuminated with a filtered light source. With the aid of a video monitor, the external collimator optical axis is made coincident with the VIS/NIR optic axis through a small opening in the temp chamber wall. The VIS/NIR's collimator lense assembly is then moved to best focus position i.e., smallest slit width as viewed on the video monitor. The slit width is then measured by utilizing an Algorithm which evaluates the CID camera output. The temperature is varied and the slit width remeasured.

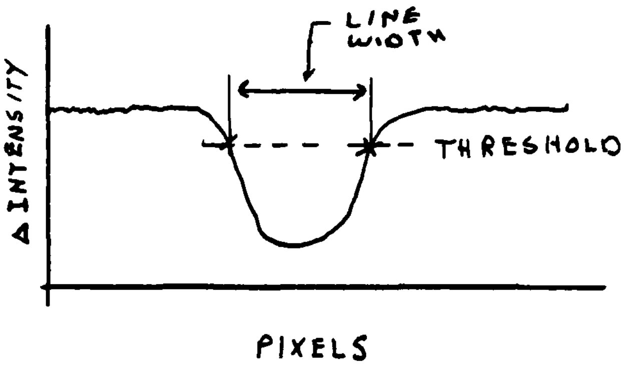
3.3.2 Focus Algorithm

To prevent dismounting and remounting of the target in the "A" tool between temperature changes, the focus test was performed by projecting a vertical white line on to the camera detector from an external collimator. The snapshot of a single horizontal line is taken with the CID camera.



Line 1 is 100 pixels long and is positioned at the horizontal center, line 120. Line 1 is searched from left to right seeking the white vertical line. This is done several times (20 to 30) and an average is taken. Each

time the line is scanned, the data is stored in a vector matrix where calculations will be made. The curve will be inverted from the boresight data because with the focus test, a white line was projected on to a black background. The curve resembles the one shown below:



The digitized data ranged from intensity levels of 255 to about 190. The threshold used was 235. Due to the inherent noise in it is necessary to take several data samples and average. It was also noted that more noise is found in white fields than in black. Occasionally, the sample was too noisy for accurate results and was automatically rejected by the software routine. Using the threshold of 235, the linewidth was calculated. Twenty good samples were taken to give greater accuracy.

With a change in temperature, it was expected that the focus of the day collimator would change. This is due to the properties of the optics in the collimator. The VIS/NIR is designed to automatically compensate for this thermal change. By taking another set of samples and calculating an average line width, it could be established whether or not the line became wider, (moved out of focus) or became narrower, (moved in focus).

Using this method of line width focus evaluation, the focus at low temperature and high temperature could be evaluated.

(See Appendix A-4 for Focus Algorithm Listing)

3.4 FIR Focus and Boresight Tests

3.4.1 Boresight and focus shifts due to thermal changes in the FIR collimator module were evaluated by image position shift and image focus degradation respectively. This is accomplished by viewing a FIR slit target with an external telescope. See Figure 3.3.

This is accomplished by attaching the EZ8-082787A tool to the FIR mounting assembly. The FIR target wheel is driven to position 5 and the slit is illuminated with the fiber optic light source through the FIR aperature. The "A" tool is then focused and the position of the slit with respect to the internal crosshairs of the "A" tool is measured. The temperature is varied and changes in position of the slit and focus of the "A" tool are recorded. (See Figure 3.2).

3.5 OSG - EO MUX Focus & Boresight Tests

3.5.1 Boresight and focus shifts due to thermal changes in the EO MUX collimator of the OSG module are be evaluated by image positions shifts. This is accomplished by establishing the EO MUX optical axis and measuring displacements of the projected target referenced to this axis. See Figure 3.4.

After installing .125" x .5" Dowel pins in the OSG EO MUX locating holes, a parallel was placed against the pins. A corner cube was placed such that one flat side was pressed against the parallel and another flat side was against EO MUX mounting surface. The third side of the corner cube establishes a plane perpendicular to the EO MUX optical axis. With K & E scope was autocollimated off flat side of corner cube. The K & E scope axis was coincident with the EO MUS's optical axis. The corner cube was removed and the OSG lamp turned on. The OSG filter was placed in the EO MUX position and the displacement in target image location with reference to the K & E scope crosshair was measured. Focus position of

scope was recorded. The temperature was varied and the scope was again set for optical focus. The two focus settings were then compared resulting in measured focus shift. See Fiqure 3.2.

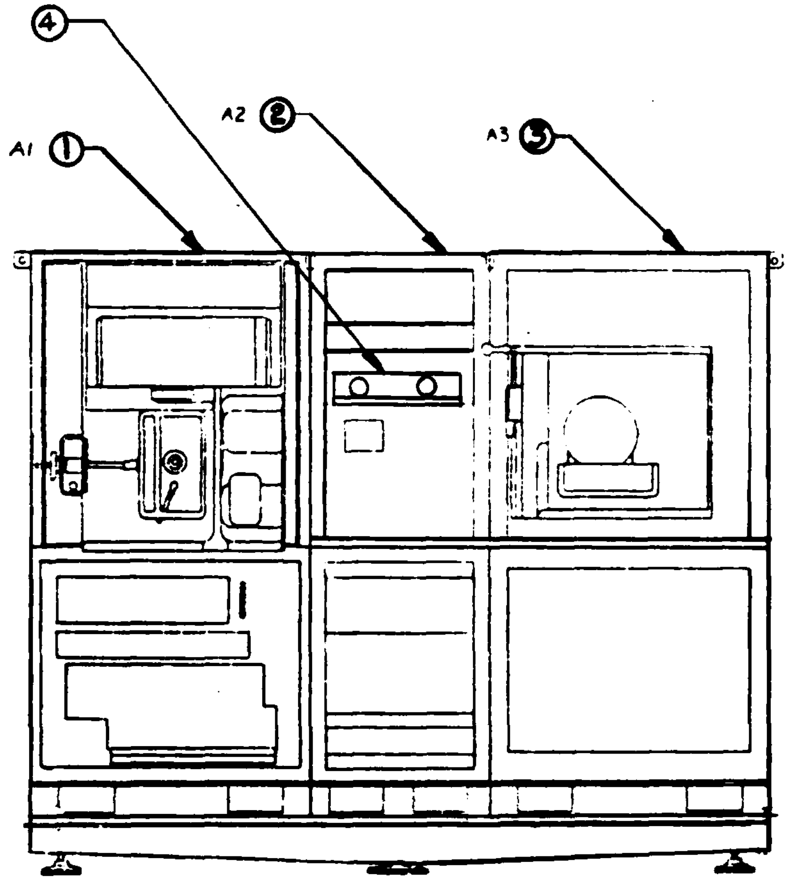
3.6 OSG - TV Focus & Boresight Tests

3.6.1 Boresight and focus shifts due to thermal changes in the TV side of the OSG module were evaluted by image position shifts. This was accomplished by superimposing the OSG target image on a crosshair reticle tool, which simultaes the TV focal plane. Image displacements were measured with a traveling microscope. See figure 3.4.

After attaching the EZ8-082798C crosshair tool to the TV side of the OSG module, the OSG lamp was illuminated, the TV mirror was set to the "OUT" position, and put the filter to the EO MUX position. The traveling microscope was focused on the center of the crosshair reticle pattern and the positions of the target image were measured in the X, Y and Z directions with reference to the crosshair pattern. Positions X, Y & Z were remeasured and recorded at hi temp. See Figure 3.2.

3.7 Augmentation Acceptance Test Procedure

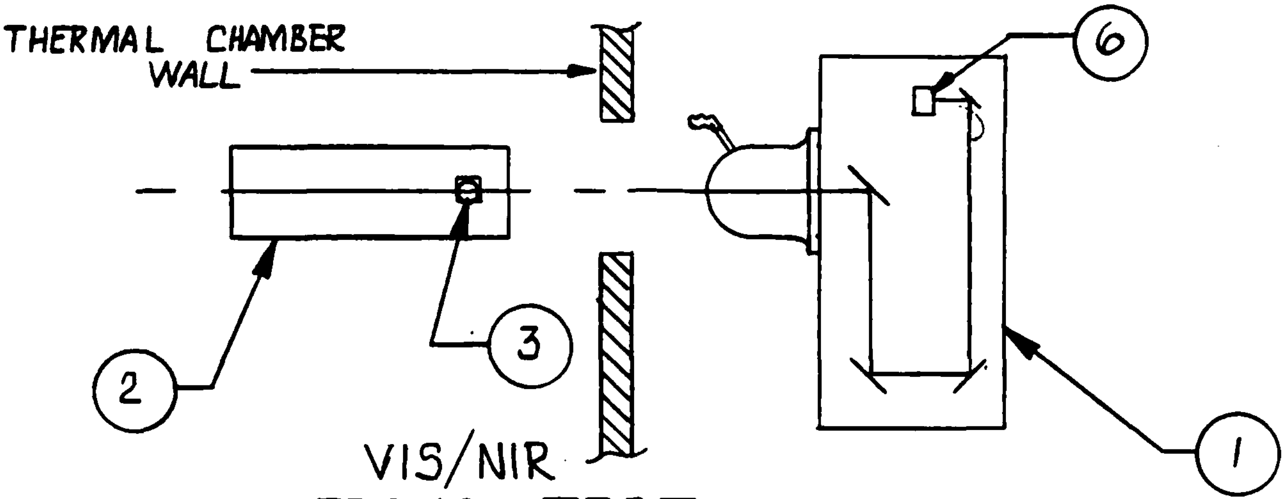
3.7.1 The E/O Augmentation Acceptance testing was performed as specified in ATP document 13082803.



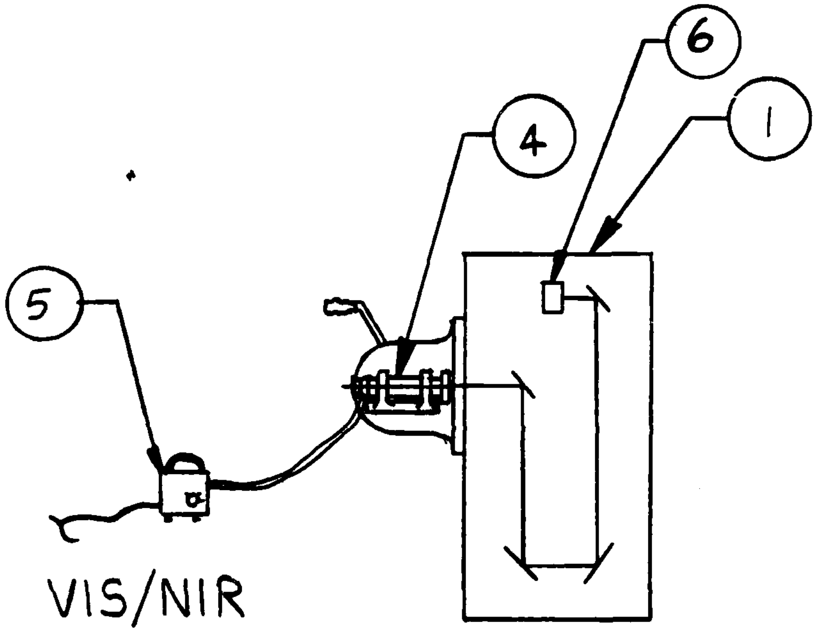
ELECTRO-OPTICAL TEST BENCH SET

PART NO.	DESCRIPTION
1	DAY SIDE TEST BENCH ASSY (13082800)
2	TEST CONSOLE TEST BENCH ASSY (13082795)
3	NIGHT SIDE TEST BENCH ASSY (13082782)
4	OSG

Figure - 3.0



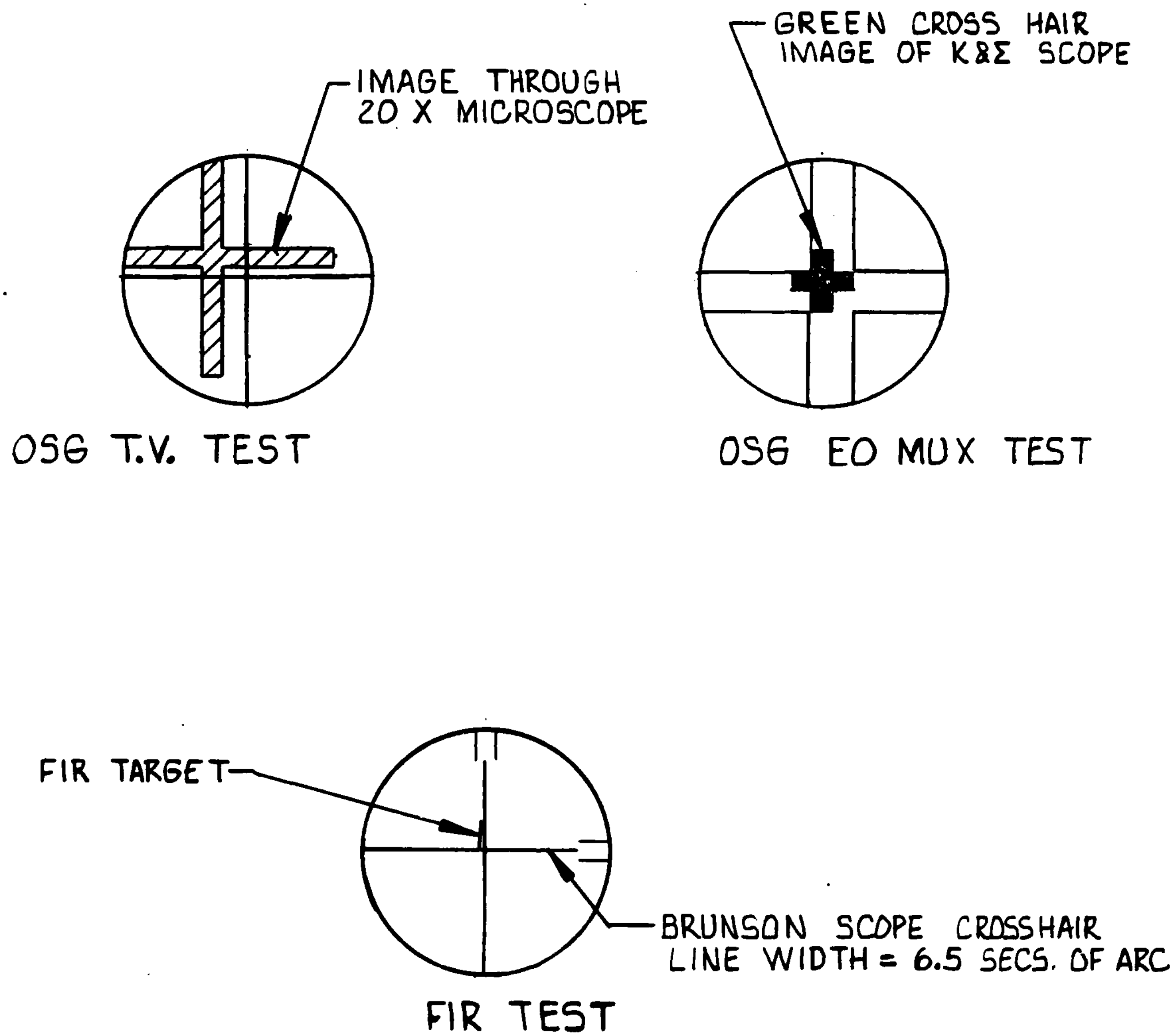
VIS/NIR
FOCUS TEST



VIS/NIR
BORESIGHT TEST

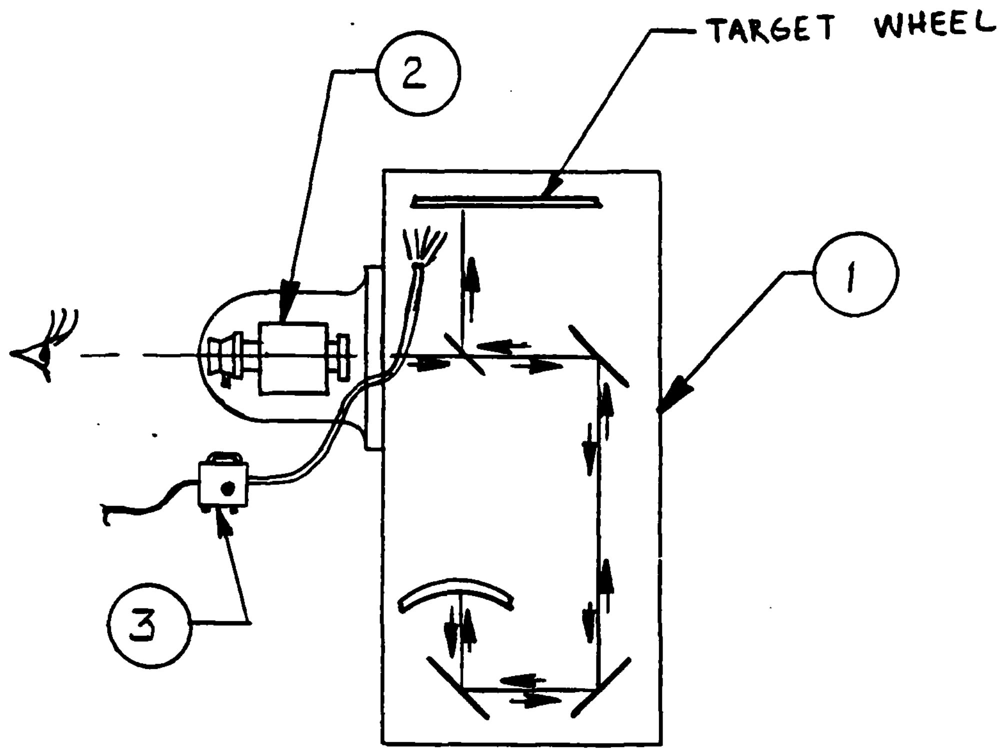
PART NO.	DESCRIPTION
1	DAY SIDE TEST BENCH ASSY (13082800)
2	EXTERNAL COLLIMATOR W/ SLIT TARGET
3	EXTERNAL LIGHT SOURCE
4	EZ8-082800 A TOOL
5	EXTERNAL LIGHT SOURCE
6	CID CAMERA

Figure - 3.1



TEST VIEWS

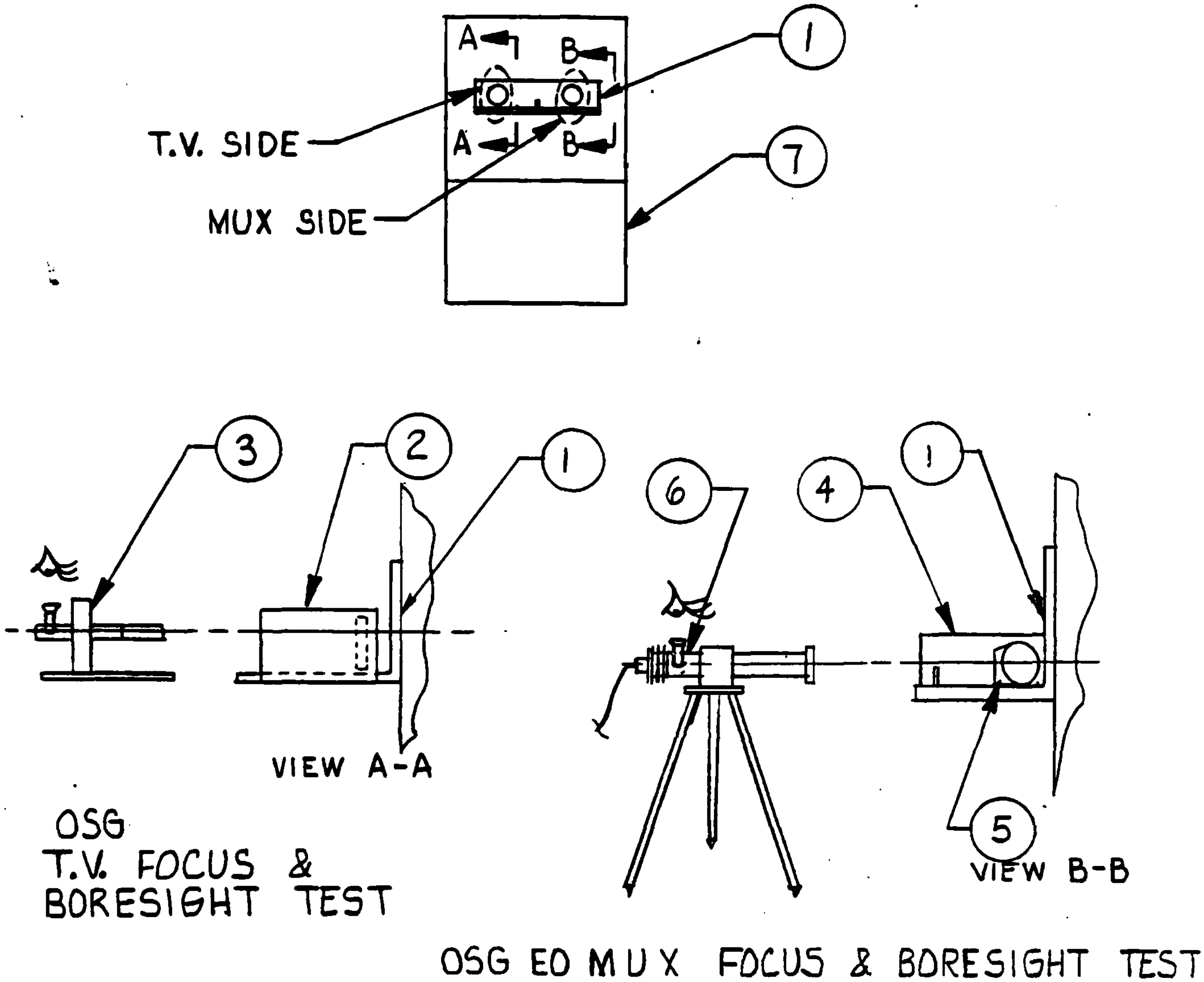
Figure - 3.2



FIR
FOCUS & BORESIGHT TEST

PART NO.	DESCRIPTION
1	NIGHT SIDE TEST BENCH ASSY (13082872)
2	EZB-082787 A TOOL
3	EXTERNAL LIGHT SOURCE, FIBER OPTICS

Figure - 3.3



PART NO.	DESCRIPTION
1	OSG
2	EZ8-082798 C TOOL
3	TRAVELLING MICROSCOPE
4	CORNER CUBE
5	PRISM
6	K & E SCOPE
7	TEST CONSOLE TEST BENCH ASSY (13082795)

Figure - 3.4

4.0 TEST RESULTS/CONCLUSIONS

4.1 Verification Test Results

Prior to demonstrating the formal environmental temperature test, a "dry run" was performed approximately one week earlier. The purpose of this testing was to identify any problem areas which needed further development, to evaluate temperature chamber performance, to verify that proper Augmentation performance was realizable during the formal temperature test demonstration, and to aid in the development of the Algorithm's used in the focus and boresight tests.

4.1.1. Low Temperature Test

The first step in this testing phase was to insure the E/O Augmentation temperature chamber was capable of maintaining the desired low temperature profile of 65 $\pm$ 3°F with the E/O Augmentation powered up and in the operating condition. To verify this 16 thermocouples were placed in the chamber to monitor air temperature profiles and equipment temperatures with a Fluke Data Logger. (See Figure 4.1).

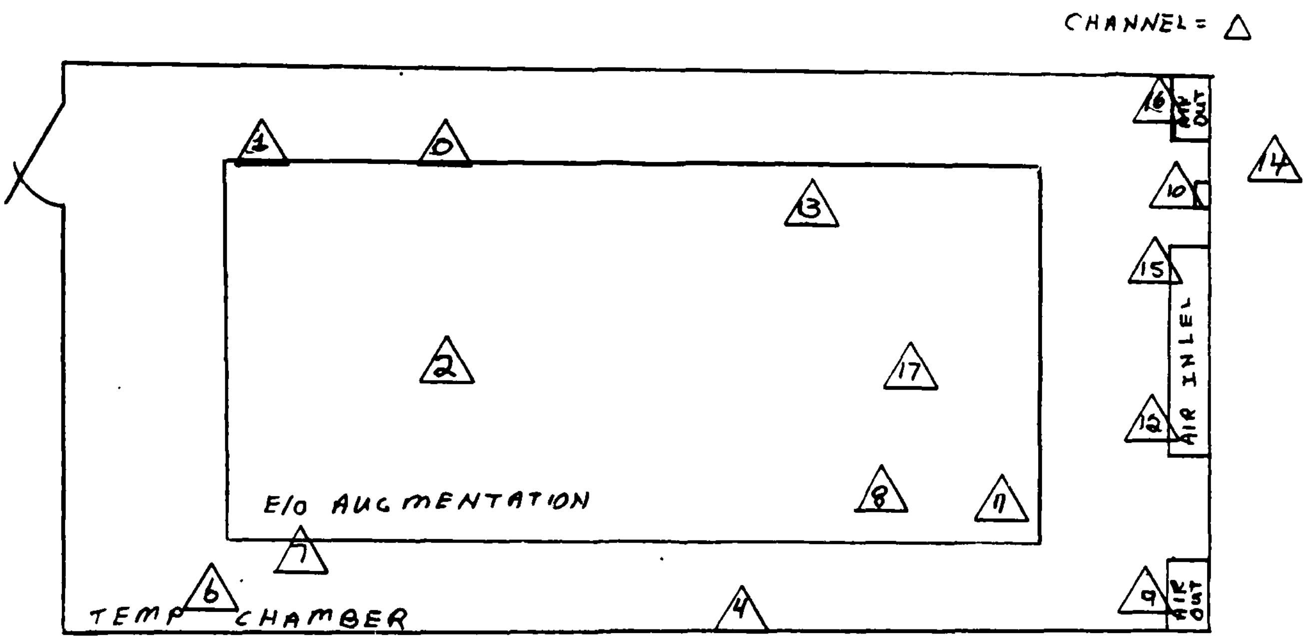


FIG. - 4.1

After the proper temperature profile were achieved, 65 ± 3°F, the E/O Augmentation was then cold soaked for 24 hours prior to the performance of the ATP. The ATP was then performed resulting in an all "tests passed" condition.

4.1.2 High Temperature Test

The next step was to verify the E/O Augmentation temperature chamber was capable of maintaining the high temperature profile of 90 ± 3°F. Once the proper temperature profile was achieved the E/O Augmentation was temperature soaked for 24 hours. The ATP was then performed and the following failures were encountered:

a) Matrix Switch ATP section 4.1.3.

b) Video Signal Generator ATP Section 4.1.10

c) Photo Multiplier Tube ATP Section 4.2.4

d) Temperature Sensors ATP Section 4.6.1.

e) 28 VDC fixed power supply failure

The matrix switch test failure (a) consisted of relay 14 in Quadant 1 on all 16 relay cards failing to close and relay 15 in Quadrant 4 on all 16 relay cards also failed to close. Investigation of this problem showed the cause was two pushed pins on the major adapter contained in the center section. This problem was determined to also be the cause of the VSG failure (b). After repairing the two pushed pins in the major adapter the Matrix switch and VSG test were reran successfully. No further action was required.

The PMT failure (c) was caused by the PMT controller going into an overload condition before the photo multiplier tube temperature sensor reached its ATP specified operating temperature. The manufacturer was contacted and informed of the problem. The manufacturer advised Martin Marietta to readjust the current overload threshold potentiometer, R14, in the PMT controller, as upon initial setup the pot was set with too low of a current threshold. Based on this advice the PMT controller was removed from the electronic station and R14, the current overload potentiometer, was set to a value 10 percent less than the initial factory setting, resulting in a higher current threshold. The PMT controller was then re-installed in the electronic station. After allowing the PMT cooler to stabilize at its operating temperature, the PMT test was successfully rerun with no overload condition existing. To prevent future occurrences of this problem MMC will consult with the PMT vendor and establish proper adjust procedures which will become part of AUG engineering data package.

The DC temperature sensors 1 and 3, located in the VIS/NIR Module, failures were caused by the sensors indicating an incorrect temperature. This was determined to be caused by the sensors being improperly wired. Engineering had previously resolved this problem and the latest augmentation configuration incorporates the necessasry wiring changes needed to correct the situation. Therefore this problem will be corrected when the Augmentation SN003 is updated to the latest engineering.

The 28 VDC fixed power supply, contained in the electronic station, failure was determined to be caused by a failure of the 600 Vdc power supply contained in the VIS/NIR Laser Simulator.

The input stage of the 600 Vdc power had become a low impedance path to ground causing the voltage output of the 28 Vdc power supply to fall off, since it could not supply the current necessary to maintain nominal voltage output. Failure analysis of the 600 Vdc power supply revealed the input stage had indeed become shorted to ground through the 555 timer, which sets the fixed switching frequency of the supply. Additional

investigation revealed a design flaw in the capacitive coupling between the drive transformer and the 555 timer. The coupling capacitor, which is a polarized polycarbonate style was installed with the reverse polarity. This caused the 555 failure by exposing it to the high voltage switching transients generated by the drive transformer. Once the 555's output stage became shorted, this created the low impedance path the ground on the +28 VDC line.

To remedy this situation the manufacturer (Advanced High Voltage Corp.) was contacted and made aware of the problem. The manufacturer has agreed to repair all existing units and incorporate design changes which will have the capacitor installed with the correct polarity.

4.1.3 VIS/NIR Focus and Boresight Agorithm Development

Throughout this testing period algorithm development was taking place. The results of this development were the generation of the two algorithms used to determine the amount of focus and boresight changes are present in the VIS/NIR. See Appendix A-4 for the Algorithm Listings and Sections 3.2.2 and 3.3.2 for an algorithm description.

4.1.4 FIR and OSG Focus and Boresight

A dry run of the procedures outlined in paragraphs 3.4 and 3.5 was performed to confirm the validity of these test procedures and familarize test conductor with the test procedures and equipment.

4.2 Formal Temp Test Results

4.2.1 ATP Test Results

4.2.1.1 Low Temp

The results of the ATP performed at the low temperature profile, 65±3°F, (See Appendix A-2 for computer tab run) demonstrate the E/O Augmentations capability to function properly at this temperature environment. Two failures were encountered; ATP sections 4.1.5, digitizer and 4.1.8 Resolver Simulator.

The digitizer failurer was caused by operator error when the test engineer incorrectly connected connector J2 of cable P/N 79906184 to major adaptor J2. After correctly connecting J2 to major adaptor J3, the digitizer test was rerun and successfully passed ATP Section 4.1.5, therefore this section was signed off and called a good test per ATP section 3.8.

The Resolver Simulator failure was a non-repeatable failure. The ATP Section 4.1.8 was rerun two successive times following the failure, each time successfully. The random failure was attributed to an Equate Missed measurement, consequently no corrective action was initiated. Upon completion of the retest, the Resolver Simulator was called a good test per ATP Section 3.8 and signed off.

The occurence of the two failures listed above and their disposition has been recorded on Mars Tag #3TL1496, (See Appendix A-7) resulting in an "all tests passed" condition at low temperature.

4.2.1.2 High Temp

The results of the ATP performed at the high temperature profile, 90±3°F, (See Appendix A-2 for computer printout), indicates three failures occurred. Sections 4.1.10 Video Signal Generator, 4.2.4 Photo Multiplier Tube, (PMT) and 4.6.1 Temperature Sensors. These failures are un-related.

The PMT failure was caused by the temperature sensor, which is located on Photo Multiplier Tube contained in the OSA, not reaching the ATP specified temperaure window of 10 $\pm$ 5°C. Actual PMT temperature reading was 17.8°C. To compensate for this the coldness setting, which is controlled by an adjustment knob on the back panel of PMT controller, contained in the electronic station, was moved to a colder setting. After allowing PMT to restabilize at a new temperature, ATP section 4.6.1 was rerun successfully. Therefore, the retest was called a good test and signed off per ATP section 3.8.

Based on the PMT failure encountered, it has been determined that further engineering evaluation and action is required in this area. A new procedure will need to be implemented to properly setup and initialize the PMT controller. This new procedure must insure the PMT is capable of reaching the correct temperature profile at both high and low temperature profiles, while also guaranteeing the PMT face plate does not reach a temperature less than 0°C, as this could cause the face plate to ice over impairing its functional operation. Action will be as indicated in paragraph 4.1.2 as a related problem occured during verification test.

The Temperature Sensors, ATP Section 4.6.1, experienced three failures, which were:

a) Temperature Sensor 1, located in the VIS/NIR gave an incorrect temperature reading
b) Temperature Sensor 3, located in the VIS/NIR gave an incorrect temperature reading.
c) DBA Source B did not reach the ATP specified temperature in the time allotted.

Failures a and b were caused by the temperature sensors being incorrectly wired. The Augmentation configuration tested, SN003, has the Temperature Sensors wired in such a fashion that they will always read a fixed temperature which is controlled by the potentiometer setting on the temperature board 13082738. The sensors were initially set to read a temperature near the low temperature profile, 65 ± 3°F, which explains why the sensors passed the low temperature ATP test run. However, when tested at the high temperature profile the failure was apparent.

This problem was discovered previously and current engineering calls for the temperature sensors to be wired correctly. The only engineering action required to correct this problem is to update the E/O Augmentation tested SN003 to the proper documentation.

The DBA Source B failure was caused by source B not being stabilized at the proper temperature within the ATP specified time. This test was immediately rerun, successfully, and signed off as a good test, per ATP section 3.8.

To insure that this problem does not reoccur, the times specified in the ATP for the DBA sources to stabilize at the programmed operating temperature will be re-evaluated to insure erroneous "NO GO" events are minimized and a slight increase in stabilization time is anticipated.

The VSG failure, ATP Section 4.1.10, failed the composite synch test. The critical timing signals which are required to pass the composite synch test are generated in Programmable Pulse Generator (PPG) and the PPG in S/N003 has had a history of intermittent problems (Mars Tag 3TL1472), therefore, it was suspect as to the cause of the VSG failure. After removing the PPG card, the timing signals in question were found to check good. The card (PPG) was then re-inserted which enabled the VSG test to check good when reran.

Further investigation revealed a thermal problem with ICs U5 and U32 on the PPG board. Replacing the IC's with new 54LS04's eliminated the thermal problem and VSG passed repeated test runs, consequently, ATP Section 4.1.10 ATP was signed off per Section 3.8.

The results of the failures listed and their disposition has been recorded on Mars Tag #3TL1498. (See Appendix A-7).

It should be noted that past engineering evaluations have revealed potential thermal problems related to the VSG. To correct this the latest engineering calls for addition of cooling holes into the equipment drawer, slots to be placed in the VSG assembly, and the camera controllers to be separated by spacing bars. All of the above will provide additional cooling to be VSG and lower the temperature inside the electronics drawer which also houses the PPG CCA. The E/O Augmentation configuration tested did not have these modifications implemented.

4.2.1.3 The signoff sheets for both ATP runs are contained in Appendix A-6.

4.2.2 FIR Results Boresight & Focus

4.2.2.1 FIR Results Boresight.

The measured displacement was 10 seconds of arc or 48.5 microradians. Six seconds of arc can be attributed to the "A' tool. The absolute measured value is 19.4 microradians.

This shift is well within the FIR budget of 0.15 mrad.

4.2.2.2 FIR Results Focus

When exposed to the two temperatue extremes, no detectable changes in focus were measured.

(See Appendix A-6 for Actual Optical Data).

This shift is well within the requirement of 4%.

4.2.3 OSG Boresight & Focus Results

4.2.3.1 EO MUX Boresight

The amount of Boresight shift measured is as follows:

X = 8 seconds of arc
Y = 16 seconds of arc

This shift is well within the requirement of $\pm$ 0.002 in.

4.2.3.2 EO MUX Focus

No preceptable change in focus was measured between the high an low temperature extremes.

(See Appendix A-6 for Actual Optical Data).

4.2.3.3 TV Boresight

The following Boresight shifts were measured:

Y = .0002"
X = -.0012"

A .0006" displacement can be attributed to the "C" tool thermal characterization. Therefore, the absolute measured values are:

Y = .0002"
X = -.0006"

This shift is well within the published requirements of - 0.002.

4.2.3.4 TV Focus

A focal change, displacement f = .0013" was observed.

(See Appendix A-6 for Actual Optical Data)

This shift is well within the published requirements of 4.0%.

4.2.4 Boresight VIS/NIR Results

4.2.4.1 VIS/NIR Boresight. The CID camera is an array of pixels separated in the X direction by .0018" and in the Y direction by .0014". The boresight displacements were measured to be:

X = 2.0 pixels x .0018" = .004"
Y = 11.2 pixels x .0014" = .016"

In angular measurements this corresponds to:

X = 33 microradians
Y = 131 microradians

The "A" tool temperature characterization accounts for 29 micro radians in the X direction, therefore, the absolute measured values are:

The required boresight accuracy is $\pm$ 0.062 mrad.

X = 4 microradians
Y = 131 microradians

Preliminary data analysis indicates that this shift will not render the VIS/NIR unusable; however, it will be necessary to establish the VIS/NIR boresight immediately prior to use of the collimator for TPS purposes. This will provide a "snapshot" of VIS/NIR alignment in the same temp. environment which the TPS will be run and serve as the basis of a relative measurement of UUT boresight shift.

4.2.4.2 VIS/NIR Focus

Preliminary data reduction of the focus data taken shows an irregularity in line width change over a continuous focus lens drive command; therefore, precise temp/focus shift conclusions cannot be made at this time. The cause of this irregularity cannot be immediately determined. Preliminary examination of data indicates that the focus stepper motor may not be executing properly; this is not believed to be a temperature induced failure.

MMC engineering will continue to investigate and take appropriate action to resolve this item.

(See Appendix A-6 for Actual Optical Data)

APPENDIX A-1

TEST PLAN

E/O AUGMENTATION ENVIRONMENTAL TEMPERATURE TEST

TEST PLAN

E/O AUGMENTATION

ENVIRONMENTAL TEMPERATURE TEST

1.0 TEST OBJECTIVE

To perform environmental, temperature, verification and qualification tests on the TADS PGSE Electronics Station and E/O Augmentation which will generate performance characteristics as a function of temperature for engineering evaluation.

2.0 TEST METHODS

The test methods employed will be a combination of automatic tests (Augmentation ATP), manual electro-optical tests, and electro-optical algorithms. All tests will be performed at 65 $\pm$ 3°F and 90 $\pm$ 3°F. The verification "dry run" test will constitute performing the Augmentation ATP and all E/O Bench focus and boresight tests. This will provide an indicator as to the performance of all test fixtures, test chambers, E/O Algorithms, and the overall test strategy. It will also identify any areas which need reevaluation or redesign to provide the required test data.

The temp test will be performed approximately 1 week after the verification test.

The E/O Augmentation is divided into the following sections:

a. Electronic Station

b. Visual-Near Infrared (VIS/NIR)

c. Optical Signal Generator (OSG)

d. Far Infrared Station (FIR)

e. Optical Signal Analyzer (OSA)

The E/O augmentation will be tested as a whole unit by the performance of the Augmentation ATP. Also items b, c, d shall be tested individually to determine focus and boresight performance characteristics as delineated in this test plan.

2.1 ELECTRONIC STATION

The Electronic Station will be evaluated by the execution of the Augmentation ATP, Drawing Number 13082803.

2.2 FAR INFRARED (FIR)

2.2.1 Electronic characteristic of the FIR Module will be evaluated by performing the ATP.

2.2.2 BORESIGHT MEASUREMENT

To determine the amount of temperature induced boresight shift, tool "A" P/N EZ8-082787A, which has been temp. characterized for alignment will be used. This tool, which mounts to the FIR in front of the optical aperture will view an externally illuminated FIR target. The amount of temperature induced reticle shift will be measured and recorded.

2.2.3 FOCUS MEASUREMENT

Focus shift will be determined by viewing the FIR target through the 'A' tool and recording focus positions at temp. extremes.

2.3 VISUAL/NEAR INFRARED (VIS/NIR)

2.3.1 Electronic characteristics of the VIS/NIR will be evaluated by the performance of the Augmentation ATP.

2.3.2 BORESIGHT ALIGNMENT

2.3.2.1 UUT OPTICAL PATH ALIGNMENT

The UUT optical path is evaluated by projecting the reticle of tool EZ8-082800A onto the internal CID camera. The output of the CID camera controller will be evaluated by a software algorithm to determine relative alignment shift between temp extremes.

2.3.3 FOCUS

The VIS/NIR UUT optical path focus shifts will be evaluated by projecting a slit from an external collimator onto the internal CID camera. Focus changes will be measured utilizing an E/O Algorithm which evaluated the CID camera controller output. These changes will be recorded between temperature extremes.

2.4 OPTICAL SIGNAL GENERATOR (OSG)

2.4.1 Electronic characteristics of the Optical Signal Generator shall be evaluated by the performance of the Augmentation ATP.

2.4.2 BORESIGHT ALIGNMENT

To measure alignment shifts of the two optical paths, test tools EZ8-082798C, K&E telescope model 71-2022, corner cube prism, traveling microscope, and parallels will be used.

The temperature characterized EZ8-082798C tool is mounted at the T.V. optical port. The OSG target image is superimposed on the (cross-hair) tool and viewed using the traveling microscope. Image shift is recorded between temp extremes.

The EO Mux optical path is measured by auto collimating off a corner cube prism mounted perpendicular to the EO Mux mounting pins (via parallels). The OSG image and corner cube are viewed in the K&E telescope. Relative image shift is recorded between temperature extremes.

2.4.3 FOCUS

Focus shift will be determined by viewing the OSG image with the K&E telescope and traveling microscope focus positions are recorded at temp extremes.

2.5 OPTICAL SIGNAL ANALYZER (OSA)

The OSA will be fuctionally evaluated by performance of the Augmentation ATP.

3.0 TEST EQUIPMENT

3.1 TEMPERATURE CHAMBERS

Two environmental test chambers will be utilized. The first test chamber will be capable containing the complete electronics station and E/O Bench, while the second will be used to temperature characterize the special test tools required.

3.1.1 E/O AUGMENTATION TEST CHAMBER

An enclosure will be designed and constructed which will house the complete Electronics Station and E/O Bench. It will be capable of maintaining the equipment under test at a constant $65 \pm 3^{O}F$ or $90 \pm 3^{O}F$. The enclosure, while maintaining the desired temperature profile, will allow the test engineer access to

the Electronic Station and E/O Bench to connect cables, perform E/O tests and perform any maintenance required.

3.1.2 TEST TOOL TEMPERATURE CHAMBER

This environmental test chamber shall be capable of maintaining a constant 65 ± 3°F or 90 ± 3°F while test tools are being evaluated as to focus and boresight changes. It shall have provisions to supply whatever power and cabling is required, while maintaining the desired temperature profile.

3.2 BORESIGHT ALIGNMENT

The following tools will be used to evaluate the Boresight shifts over temperature of the UUT indicated:

Test Tool	UUT
Tool A EZ8-082787A	FIR
EZ8-082798 C	OSG TV Optical Port
K&E telescope model 71-2022 & Corner Cube	OSG Port
Tool A EZ8-082800A	VIS/NIR UUT Optical Path

3.3 FOCUS DEGRADATION

The following test tools will be used to evaluate focus changes over temperature of the UUT indicated:

Test	UUT
Tool EZ8-082787A	FIR
K&E telescope	OSG-EO Mux
Tool A EZ8-082800A	VIS/NIR UUT Optical Path
Traveling Microscope	OSG-TV

4.0 INSTRUMENTATION

The E/O Augmentation Test Chamber will have thermocouples installed at locations thermal analysis dictates necessary. Once installed all temperature outputs will be monitored to verify the temp of both the test chamber and equipment under test is maintained within the specified temperature windows.

5.0 AUGMENTATION - E/O BENCH

The data obtained by running the Augmentation ATP will be utilized as the baseline data for the environmental test. Initial focus and boresight data points at room temperature will not be taken due to the small temperature differential between 65°F and room ambient.

5.1 TEST TOOLS

All test tools which will affect test measurement accuracies will be temperature characterized prior to the verification test. This characterization shall consist of placing the tools in the tooling environmental test chamber and measuring boresight changes over the temperature range of interest. This data shall be recorded and utilized when characterizing the augmentation.

6.0 DATA ACQUISITION AND REDUCTION

6.1 ACQUISITION

Data will be acquired in three fashions:

1. Computer Printouts - The results of the Augmentation ATP and the E/O Algorithms will be recorded via the computer readout.
2. Engineering Records - The data obtained by man in loop readings, such as measured boresight shifts and calibration data, will be recorded manually.
3. Data Logger Printout - The temperature profile of the environmental chamber and E/O Bench will be monitored and recorded by a fluke data logger.

All pertinent data will be recorded and documented for inclusion in the final report.

7.0 GOVERMENT FURNISHED EQUIPMENT

The GFE will consist of a TADS/PNVS Augmentation Unit - P/N 1308-2808-19 (E/O Bench and Electronic Station) S/N 0003.

This unit is provided on a rent free, noninterference basis. The unit remains accountable as Government Property under Contract DAAK50-80-C-0014.

E/O AUGMENTATION

ENVIRONMENTAL TEMPERATURE TEST

DATA SHEET

	65°F	90°F	
1. FIR MODULE			
A) BORESIGHT	______	______	
B) FOCUS	______	______	
C) ATP	______	______	PASSED
	______	______	
2. VIS/NIR MODULE			
A) BORESIGHT	______	______	
B) FOCUS	______	______	
C) ATP	______	______	PASSED
	______	______	
3. OSG			
A) BORESIGHT			
TV	______	______	
EO MUX	______	______	
B) FOCUS			
TV	______	______	
EO MUX	______	______	
C) ATP	______	______	PASSED
	______	______	
4. OSA			
A) ATP	______	______	PASSED
	______	______	

APPENDIX A-2

ACCEPTANCE TEST PROCEDURE COMPUTER PRINTOUTS CHECKSUM PRINTOUT

AVG TEMP TEST COLD RUN (ATP)

UUT PROGRAM: CALCST.IC COMPILED ON: 10-JAN-83 8:29:59
TESTED: 8/15/83 14:48:10 USING SYSTEM TADS/PNVS 4

8-15-83
begun 2:40 PM

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

TEST COMPLETE - CALCULATE COMMAND SET OK

```
OUT PROGRAM: PLLBUS.IC                COMPILED ON:  25-OCT-82 10:7:53
TESTED:  8/15/83 14:54:18                     USING SYSTEM TADS/PHVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                         ** ORIGINAL SYSTEM CAL APPLIED
                         ** MEAS CAL APPLIED
                         ** STIM CAL APPLIED
                         NO RF STATION CAL APPLIED


                 PARALLEL BUS PASSED ALL TESTS
```

```
UUT PROGRAM: MTRX57.IC               COMPILED ON:  8-DEC-82 17:36:34
TESTED:  6/15/83 14:56:47                     USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --UGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07


                        C A L I B R A T I O N   S T A T U S
                               ** ORIGINAL SYSTEM CAL APPLIED
                               ** MEAS CAL APPLIED
                               ** STIM CAL APPLIED
                               NO RF STATION CAL APPLIED

 RLD RESISTANCE =  2.89


          MATRIX SWITCH PASSED ALL TESTS
```

UUT PROGRAM: ADST.IC   COMPILED ON: 7-DEC-82 10:52:55
TESTED: 6/15/83 15:2:5   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S

** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

A/D CONVERTER PASSED ALL TESTS

```
UUT PROGRAM: DIGITST.IC            COMPILED ON:  9-FEB-83 16:24:59
TESTED:  6/15/83 15:7:5            USING SYSTEM IADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                          ** ORIGINAL SYSTEM CAL APPLIED
                          ** MEAS CAL APPLIED
                          ** STIM CAL APPLIED
                          NO RF STATION CAL APPLIED

WARNING, 10488 MESSAGE: 40

ERROR IN DIGITIZER- A CHAN. PULSE TST REPLACE
      PERIOD = 0    AMPLITUDE = 0.00

      IF YOU WISH TO RETRY THIS TEST                DEPRESS <YES>
      IF YOU WISH TO STOP                           DEPRESS <NO>

WARNING, 10488 MESSAGE: 40

ERROR IN DIGITIZER- A CHAN. PULSE TST REPLACE
      PERIOD = 0    AMPLITUDE = 0.00

      IF YOU WISH TO RETRY THIS TEST                DEPRESS <YES>
      IF YOU WISH TO STOP                           DEPRESS <NO>
```

J2 connected
instead of J3

```
UUT PROGRAM: DIGITST.IC            COMPILED ON:  9-FEB-83 16:24:59
TESTED:  6/15/83 15:15:19               USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07


                  C A L I B R A T I O N   S T A T U S
                       ** ORIGINAL SYSTEM CAL APPLIED
                       ** MEAS CAL APPLIED
                       ** STIM CAL APPLIED
                       NO RF STATION CAL APPLIED


WARNING, 10488 MESSAGE: 40

ERROR IN DIGITIZER- A CHAN. PULSE TST REPLACE
     PERIOD = 0    AMPLITUDE = 0.00

     IF YOU WISH TO RETRY THIS TEST                    DEPRESS <YES>
     IF YOU WISH TO STOP                               DEPRESS <NO>
```

Digitizer Failed

Channel A 186

UUT PROGRAM: FPSS1.IC   COMPILED ON: 25-OCT-82 10:10:48
TESTED: 6/15/83 15:21:4   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --OGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

FIXED POWER SUPPLIES PASSED ALL TESTS.

```
UUT PROGRAM: PPSST.IC                    COMPILED ON:  10-DEC-82 13:18:43
TESTED:  6/15/83 15:22:16                         USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                          ** ORIGINAL SYSTEM CAL APPLIED
                          ** MEAS CAL APPLIED
                          ** STIM CAL APPLIED
                          NO RF STATION CAL APPLIED

 LEAD RESISTANCE =  2.899

       PROGRAMMABLE POWER SUPPLIES PASSED ALL TESTS
```

```
UUT PROGRAM: RSST.IC                    COMPILED ON:  10-JAN-83 8:37:32
TESTED:  6/15/83 15:31:6                    USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                  C A L I B R A T I O N   S T A T U S
                                ** ORIGINAL SYSTEM CAL APPLIED
                                ** MEAS CAL APPLIED
                                ** STIM CAL APPLIED
                                NO RF STATION CAL APPLIED


        GIVEN ANGLE  60.00000     COMPUTED ANGLE  90.00000
        IF YOU WISH TO

               RECORD AND CONTINUE                      DEPRESS <YES>
               REMOVE AND REPLACE RESOLVER              DEPRESS <NO>
ERROR IN RESOLVER SIMULATOR SELF-TEST FOR ANGLE= 60.000
```

UUT PROGRAM: RSST.1C   COMPILED ON: 10-JAN-83 8:37:32
TESTED: 8/15/83 15:36:14   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --UGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

RESOLVER SIMULATOR PASSED ALL TESTS

```
UUT PROGRAM: RSST.IC                    COMPILED ON:  10-JAN-83 8:37:32
TESTED:  6/15/83 15:40:9                      USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --UGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                      C A L I B R A T I O N   S T A T U S
                             ** ORIGINAL SYSTEM CAL APPLIED
                             ** MEAS CAL APPLIED
                             ** STIM CAL APPLIED
                             NO RF STATION CAL APPLIED


        RESOLVER SIMULATOR PASSED ALL TESTS
```

```
UUT PROGRAM: DIGITST.JC              COMPILED ON:  9-FEB-83 16:24:59
TESTED:  6/15/83 15:45:0                  USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                          ** ORIGINAL SYSTEM CAL APPLIED
                          ** MEAS CAL APPLIED
                          ** STIM CAL APPLIED
                          NO RF STATION CAL APPLIED


DIGITIZER PASSED ALL TESTS
```

```
UUT PROGRAM: PPGTST.IC              COMPILED ON:  25-OCT-82 10:12:42
TESTED:  8/15/83 15:46:41                 USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                   C A L I B R A T I O N   S T A T U S
                          ** ORIGINAL SYSTEM CAL APPLIED
                          ** MEAS CAL APPLIED
                          ** STIM CAL APPLIED
                          NO RF STATION CAL APPLIED


                   PROGRAMMABLE PULSE GENERATOR PASSED ALL TESTS
```

UUT PROGRAM: VSGST.JC   COMPILED ON: 13-JAN-83 6:52:14
TESTED: 6/15/83 15:52:20   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --UGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S

** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

TEST OF 525 LINE RATE VIDEO SYNC SIGNAL
TEST OF 875 LINE RATE VIDEO SYNC SIGNAL
TEST OF COMPOSITE VIDEO WITHOUT SINE WAVE
TEST OF COMPOSITE VIDEO WITH SINE WAVE
TEST OF CAMERA SYNC SIGNALS
TEST OF CVIDEO SIGNAL

VIDEO SIGNAL GENERATOR PASSED ALL TESTS

```
UUT PROGRAM: USADAF.IC          COMPILED ON:  25-OCT-82 10:13:41
TESTED:  8/15/83 15:56:39               USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --UGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                         ** ORIGINAL SYSTEM CAL APPLIED
                         ** MEAS CAL APPLIED
                         ** STIM CAL APPLIED
                         NO RF STATION CAL APPLIED


      USA FILTER PASSED ALL TESTS
```

```
UUT PROGRAM: USAOAS.IC              COMPILED ON:  25-OCT-82 10:14:6
TESTED:  6/15/83 15:57:35                  USING SYSTEM TADS/PNVS 4

* RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                         ** ORIGINAL SYSTEM CAL APPLIED
                         ** MEAS CAL APPLIED
                         ** STIM CAL APPLIED
                         NO RF STATION CAL APPLIED

WARNING, I0488 MESSAGE: 40

     USA SHUTTER PASSED ALL TESTS
```

```
UUT PROGRAM: UAFOCUS.IC          COMPILED ON:  24-NOV-82 9:6:42
TESTED:  8/15/83 15:59:13                USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                C A L I B R A T I O N   S T A T U S
                        ** ORIGINAL SYSTEM CAL APPLIED
                        ** MEAS CAL APPLIED
                        ** STIM CAL APPLIED
                        NO RF STATION CAL APPLIED


                USA FOCUS PASSED ALL TESTS
```

UUT PROGRAM: PMILED.JC COMPILED ON: 25-OCT-82 10:14:51
TESTED: 6/15/83 16:0:41 USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

USA PMT SOURCE PASSED ALL TESTS

```
UUT PROGRAM: IVDST.IC                    COMPILED ON:  24-NOV-82 12:38:50
TESTED:  6/15/83 16:3:47                          USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --OGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                         ** ORIGINAL SYSTEM CAL APPLIED
                         ** MEAS CAL APPLIED
                         ** STIM CAL APPLIED
                         NO RF STATION CAL APPLIED

RLD RESISTANCE =  2.89
IVD PASSED ALL TESTS.
```

UUT PROGRAM: OSGOGM.IC   COMPILED ON: 25-OCT-82 10:16:41
TESTED: 8/15/83 16:10:52   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --OGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

OSG MIRROR PASSED ALL TESTS

```
UUT PROGRAM: OSGOGF.IC            COMPILED ON:  25-OCT-82 10:16:18
TESTED:  8/15/85 16:11:34                 USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --OGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                              ** ORIGINAL SYSTEM CAL APPLIED
                              ** MEAS CAL APPLIED
                              ** STIM CAL APPLIED
                              NO RF STATION CAL APPLIED


          OSG FILTER PASSED ALL TESTS
```

UUT PROGRAM: USGOGA.IC COMPILED ON: 25-OCT-82 10:17:5
TESTED: 6/15/83 16:12:13 USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --OGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

USG DIFF/FILTER PASSED ALL TESTS

UUT PROGRAM: USGOGL.IC	COMPILED ON: 6-DEC-82 13:27:5
TESTED: 8/15/83 16:13:21	USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

USG LAMP PASSED ALL TESTS

```
UUT PROGRAM: DCDCS.1C            COMPILED ON:  25-OCT-82 10:17:56
TESTED:  8/15/83 16:14:51                 USING SYSTEM TAPS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 15-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                          ** ORIGINAL SYSTEM CAL APPLIED
                          ** MEAS CAL APPLIED
                          ** STIM CAL APPLIED
                          NO RF STATION CAL APPLIED


      DC SHUTTER PASSED ALL TESTS
```

```
UUT PROGRAM: GCAPIR.IC            COMPILED ON:  24-NOV-82 8:50:47
TESTED:  6/15/83 16:15:24                  USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --OGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                          ** ORIGINAL SYSTEM CAL APPLIED
                          ** MEAS CAL APPLIED
                          ** STIM CAL APPLIED
                          NO RF STATION CAL APPLIED


        DC A MIRROR PASSED ALL TESTS

SEVERE ERROR, FILE DOES NOT EXIST: DCDCL.IC
```

```
UUT PROGRAM: DCDCTL.IC              COMPILED ON:  6-DEC-82 13:43:24
TESTED:  8/15/83 16:29:2                    USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                   C A L I B R A T I O N   S T A T U S
                             ** ORIGINAL SYSTEM CAL APPLIED
                             ** MEAS CAL APPLIED
                             ** STIM CAL APPLIED
                             NO RF STATION CAL APPLIED


       DC INTERNAL LAMP PASSED ALL TESTS
```

UUT PROGRAM: DCEXSO.IC COMPILED ON: 6-DEC-82 13:44:56
TESTED: 6/15/83 16:33:5 USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N S T A T U S

** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

DC EX SOURCE/TARGET PASSED ALL TESTS

UUT PROGRAM: DCFOCUS.IC   COMPILED ON: 24-NOV-82 8:59:17
TESTED: 8/15/83 16:34:15   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

DC FOCUS PASSED ALL TESTS

UUT PROGRAM: DCVARF.TC   COMPILED ON: 25-OCT-82 10:19:52
TESTED: 6/15/83 16:40:43   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --UGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

DC VARIABLE FILTER PASSED ALL TESTS

```
DUT PROGRAM: EXTRAD.IC              COMPILED ON:  25-OCT-82 10:20:15
TESTED:  6/15/83 16:41:36                  USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 15-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                         ** ORIGINAL SYSTEM CAL APPLIED
                         ** MEAS CAL APPLIED
                         ** STIM CAL APPLIED
                         NO RF STATION CAL APPLIED


                  EXTERNAL RADIOMETER PASSED ALL TESTS
```

UUT PROGRAM: DCB6MIR.IC   COMPILED ON: 24-NOV-82 8:51:56
TESTED: 6/15/83 16:43:12   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --CGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

DC B MIRROR PASSED ALL TESTS

UUT PROGRAM: DCINTCAM.IC COMPILED ON: 6-DEC-82 13:27:33
TESTED: 8/15/83 16:50:22 USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

DC INTERNAL CAMERA PASSED ALL TESTS

```
UUT PROGRAM: DCEXTCAM.IC                    COMPILED ON:  27-OCT-82 14:6:14
TESTED:  6/15/83 16:53:15                   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                              ** ORIGINAL SYSTEM CAL APPLIED
                              ** MEAS CAL APPLIED
                              ** STIM CAL APPLIED
                              NO RF STATION CAL APPLIED


      DC EXTERNAL CAMERA PASSED ALL TESTS
```

UUT PROGRAM: DCLASER.IC   COMPILED ON: 2-DEC-82 11:32:26
TESTED: 6/15/83 16:58:1   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --UGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S

** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

DC LASER PASSED ALL TESTS

UUT PROGRAM: INTRAD.IC   COMPILED ON: 25-OCT-82 10:22:9
TESTED: 8/15/83 16:59:11   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 15-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S

** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

INTERNAL RADIOMETER PASSED ALL TESTS

UUT PROGRAM: FIRCSST.IC   COMPILED ON: 25-OCT-82 10:22:33
TESTED: 8/15/83 17:0:21   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --UGL 2.10 15-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

FIR SHUTTER PASSED ALL TESTS

```
UUT PROGRAM: FIRCTGST.IC                    COMPILED ON:  24-NOV-82 9:5:32
TESTED:  6/15/83 17:1:18                    USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                         ** ORIGINAL SYSTEM CAL APPLIED
                         ** MEAS CAL APPLIED
                         ** STIM CAL APPLIED
                         NO RF STATION CAL APPLIED


      FIR TARGET PASSED ALL TESTS
```

UUT PROGRAM: FIRCAST.IC   COMPILED ON: 24-NOV-82 9:4:27
TESTED: 8/15/85 17:2:55   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --IGL 2.10 15-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S

** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

FIR APERTURE PASSED ALL TESTS

```
UUT PROGRAM: FLBORE.IC              COMPILED ON:  2-DEC-82 10:10:21
TESTED:  6/15/83 17:3:56                  USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --OGL 2.10 15-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                         ** ORIGINAL SYSTEM CAL APPLIED
                         ** MEAS CAL APPLIED
                         ** STIM CAL APPLIED
                         NO RF STATION CAL APPLIED

0.05066   0.01923

     FIR BORESIGHT PASSED ALL TESTS
```

```
UUT PROGRAM: BITCHECK.1C                          COMPILED ON:  9-DEC-82 14:18:17
TESTED:  8/15/83 17:5:5               USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                         ** ORIGINAL SYSTEM CAL APPLIED
                         ** MEAS CAL APPLIED
                         ** STIM CAL APPLIED
                         NO RF STATION CAL APPLIED


                    ALL BITS PASSED TEST
```

UUT PROGRAM: LASERST.IC   COMPILED ON: 1-DEC-82 14:40:0
TESTED: 6/15/83 17:6:50   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DBL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S

** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

RLD RESISTANCE = 2.66

*** LASER INTERLOCK & POWER CHECK PASSED ALL TESTS ***

```
UUT PROGRAM: AUGTEM.IC            COMPILED ON:  9-DEC-82 11:39:28
TESTED:  6/15/83 17:21:19                 USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                  C A L I B R A T I O N   S T A T U S
                        ** ORIGINAL SYSTEM CAL APPLIED
                        ** MEAS CAL APPLIED
                        ** STIM CAL APPLIED
                        NO RF STATION CAL APPLIED

AMBIENT TEMPERATURE = 20.54 DEG C FROM NIGHTSIDE

     DC TEMPERATURE SENSOR PASSED ALL TESTS

     FIR TEMPERATURE SENSOR PASSED ALL TESTS

     FIR TEMPERATURE CONTROLLER (DBA) PASSED ALL TESTS
```

…mp Tapes: Low Temp Demo

17	70.2	F
16	69.6	F
15	68.4	F
14	76.2	F
13	67.7	F
12	66.2	F
11	67.3	F
10	68.5	F
9	69.8	F
8	67.5	F
7	73.3	F
6	70.9	F
5	70.1	F
4	69.2	F
3	****.*	F
2	73.3	F
1	****.*	F
0	67.0	F

000000
226:01:07:57

17	70.3	F
16	69.9	F
15	68.3	F
14	76.5	F
13	67.5	F
12	65.8	F
11	68.9	F
10	68.6	F
9	70.0	F
8	69.1	F
7	73.3	F
6	71.1	F
5	70.5	F
4	65.6	F
3	****.*	F
2	73.5	F
1	****.*	F
0	68.1	F

000000
226:03:07:57

17	66.4	F
16	65.9	F
15	64.4	F
14	75.9	F
13	57.3	F
12	57.4	F
11	70.0	F
10	65.6	F
9	65.6	F
8	70.1	F
7	69.9	F
6	65.9	F
5	66.2	F
4	65.0	F
3	****.*	F
2	169.9	F
1	****.*	F
0	68.6	F

000000
226:05:07:57

17	69.9	F
16	69.2	F
15	68.8	F
14	76.4	F
13	67.6	F
12	66.3	F
11	66.6	F
10	69.0	F
9	70.1	F
8	66.7	F
7	72.7	F
6	70.7	F
5	69.6	F
4	65.9	F
3	****.*	F
2	73.0	F
1	****.*	F
0	66.1	F

000000
226:00:07:57

17	70.3	F
16	69.6	F
15	67.8	F
14	76.2	F
13	67.6	F
12	65.9	F
11	56.0	F
10	68.6	F
9	69.5	F
8	68.5	F
7	73.2	F
6	71.0	F
5	70.4	F
4	68.9	F
3	****.*	F
2	73.5	F
1	****.*	F
0	67.7	F

000000
226:02:07:57

17	70.7	F
16	70.0	F
15	65.7	F
14	76.5	F
13	67.5	F
12	66.2	F
11	69.5	F
10	69.2	F
9	69.5	F
8	69.7	F
7	73.3	F
6	71.2	F
5	70.8	F
4	69.4	F
3	****.*	F
2	73.6	F
1	****.*	F
0	68.5	F

000000
226:04:07:57

Low Temp Demo

17	71.6	F
16	71.2	F
15	72.0	F
14	76.3	F
13	75.3	F
12	74.0	F
11	69.5	F
10	71.2	F
9	71.9	F
8	66.7	F
7	72.2	F
6	73.5	F
5	69.6	F
4	71.3	F
3	****.*	F
2	72.8	F
1	****.*	F
0	67.0	F

000006
226:07:07:57

17	63.7	F
16	63.7	F
15	63.7	F
14	75.4	F
13	57.6	F
12	57.7	F
11	68.5	F
10	63.2	F
9	63.7	F
8	68.0	F
7	67.0	F
6	64.3	F
5	65.4	F
4	63.0	F
3	****.*	F
2	67.1	F
1	****.*	F
0	66.3	F

000007
226:09:07:57

17	69.1	F
16	69.0	F
15	68.0	F
14	76.0	F
13	67.6	F
12	66.5	F
11	67.8	F
10	68.3	F
9	66.5	F
8	67.2	F
7	71.5	F
6	70.2	F
5	69.4	F
4	69.0	F
3	****.*	F
2	71.9	F
1	****.*	F
0	66.0	F

000001
226:11:07:57

17	64.2	F
16	63.8	F
15	62.4	F
14	75.4	F
13	57.2	F
12	57.4	F
11	70.1	F
10	63.3	F
9	64.1	F
8	69.7	F
7	66.6	F
6	64.0	F
5	65.6	F
4	62.9	F
3	****.*	F
2	66.7	F
1	****.*	F
0	67.7	F

[illegible]
226:06:07:57

17	63.8	F
16	63.6	F
15	63.4	F
14	75.1	F
13	57.4	F
12	57.6	F
11	69.0	F
10	63.7	F
9	63.4	F
8	68.3	F
7	66.3	F
6	63.8	F
5	64.9	F
4	62.4	F
3	****.*	F
2	66.5	F
1	****.*	F
0	66.5	F

[illegible]
226:08:07:57

17	63.9	F
16	63.8	F
15	62.1	F
14	75.4	F
13	57.9	F
12	58.0	F
11	68.2	F
10	63.6	F
9	63.4	F
8	67.5	F
7	66.3	F
6	63.9	F
5	64.7	F
4	63.8	F
3	****.*	F
2	66.5	F
1	****.*	F
0	65.6	F

[illegible]
226:10:07:57

Low Temp Demo

17	66.0	°F
16	66.3	°F
15	63.9	°F
14	78.2	°F
13	59.3	°F
12	58.4	°F
11	65.0	°F
10	64.1	°F
9	64.9	°F
8	65.0	°F
7	69.9	°F
6	66.4	°F
5	67.9	°F
4	64.3	°F
3	*****	°F
2	65.9	°F
1	67.2	°F
0	67.1	°F

0.0000
226:16:32:36

17	65.1	°F
16	63.5	°F
15	62.5	°F
14	77.3	°F
13	55.1	°F
12	58.3	°F
11	67.7	°F
10	62.6	°F
9	63.7	°F
8	67.5	°F
7	67.2	°F
6	64.7	°F
5	65.4	°F
4	63.0	°F
3	*****	°F
2	67.3	°F
1	65.9	°F
0	66.3	°F

0.0000
225:20:32:36

17	66.4	°F
16	65.0	°F
15	63.4	°F
14	77.5	°F
13	58.0	°F
12	58.2	°F
11	68.4	°F
10	63.6	°F
9	65.9	°F
8	65.7	°F
7	69.9	°F
6	66.1	°F
5	67.9	°F
4	65.4	°F
3	*****	°F
2	69.9	°F
1	65.5	°F
0	65.0	°F

0.0000
227:00:32:36

17	64.6	°F
16	64.4	°F
15	62.2	°F
14	77.1	°F
13	57.9	°F
12	56.1	°F
11	68.0	°F
10	62.5	°F
9	64.1	°F
8	67.6	°F
7	67.5	°F
6	64.7	°F
5	65.8	°F
4	63.4	°F
3	*****	°F
2	67.7	°F
1	*****	°F
0	66.3	°F

0.0000
226:14:32:35

17	64.6	°F
16	64.0	°F
15	62.6	°F
14	77.1	°F
13	56.1	°F
12	58.2	°F
11	68.0	°F
10	63.2	°F
9	63.6	°F
8	67.6	°F
7	67.1	°F
6	64.7	°F
5	65.5	°F
4	63.3	°F
3	*****	°F
2	67.3	°F
1	65.0	°F
0	66.3	°F

0.0000
226:18:32:36

17	65.0	°F
16	63.9	°F
15	62.7	°F
14	77.5	°F
13	58.2	°F
12	58.3	°F
11	68.0	°F
10	62.9	°F
9	64.1	°F
8	65.0	°F
7	67.5	°F
6	64.9	°F
5	65.5	°F
4	63.5	°F
3	*****	°F
2	67.7	°F
1	66.2	°F
0	67.1	°F

0.0000
226:22:32:36

Low Temp Demo

13	76.4	F
12	72.7	F
11	66.3	F
10	70.4	F
9	70.2	F
8	68.2	F
7	70.2	F

17	67.3	F
16	66.0	F
15	65.5	F
14	77.1	F
13	67.6	F
12	65.7	F
11	66.5	F
10	65.4	F
9	65.4	F
8	65.5	F
7	67.8	F
6	67.6	F
5	67.0	F
4	66.4	F
3	****.*	F
2	66.2	F
1	67.5	F
0	67.3	F

00000
227:04:32:36

17	[illegible]4.6	F
16	63.3	F
15	61.0	F
14	77.0	F
13	61.2	F
12	59.7	F
11	65.3	F
10	[illegible]1.3	F
9	64.2	F
8	65.1	F
7	67.3	F
6	64.1	F
5	65.9	F
4	63.3	F
3	****.*	F
2	67.3	F
1	66.3	F
0	67.2	F

00000
227:08:16:15

17	69.2	F
16	68.0	F
15	67.9	F
14	77.6	F
13	68.7	F
12	67.4	F
11	66.5	F
10	65.0	F
9	69.0	F
8	65.2	F
7	70.4	F
6	69.4	F
5	66.2	F
4	66.2	F
3	****.*	F
2	70.8	F
1	69.6	F
0	67.3	F

00000
227:02:32:36

17	65.4	F
16	64.7	F
15	63.0	F
14	77.8	F
13	56.9	F
12	55.1	F
11	66.7	F
10	63.4	F
9	65.0	F
8	66.6	F
7	67.7	F
6	65.3	F
5	66.0	F
4	64.8	F
3	****.*	F
2	67.9	F
1	66.3	F
0	67.6	F

00000
227:06:32:36

UUT PROGRAM: CALCST.IC COMPILED ON: 10-JAN-83 8:29:59
TESTED: 8/17/83 10:38:15 USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

TEST COMPLETE - CALCULATE COMMAND SET OK

Augmentation Temperature Test
High Temperature ATP Test
8-17-83 ; 11:15 AM

```
UUT PROGRAM: PLLBUS.IC              COMPILED ON:  25-OCT-82 10:7:53
TESTED:  8/17/83 10:46:26                 USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                            ** ORIGINAL SYSTEM CAL APPLIED
                            ** MEAS CAL APPLIED
                            ** STIM CAL APPLIED
                            NO RF STATION CAL APPLIED


                  PARALLEL BUS PASSED ALL TESTS
```

```
UUT PROGRAM: MTRXSV.IC            COMPILED ON:  8-DEC-82 17:36:34
TESTED:  8/17/83 10:48:33                  USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                 C A L I B R A T I O N   S T A T U S
                      ** ORIGINAL SYSTEM CAL APPLIED
                      ** MEAS CAL APPLIED
                      ** STIM CAL APPLIED
                      NO RF STATION CAL APPLIED

 RLD RESISTANCE =  3.04


      MATRIX SWITCH PASSED ALL TESTS
```

```
UUT PROGRAM: ADST.IC                    COMPILED ON:  7-DEC-82 10:52:55
TESTED:  6/17/83 10:51:12                    USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                              ** ORIGINAL SYSTEM CAL APPLIED
                              ** MEAS CAL APPLIED
                              ** STIM CAL APPLIED
                              NO RF STATION CAL APPLIED


                     A/D CONVERTER PASSED ALL TESTS
```

UUT PROGRAM: DIGITST.IC   COMPILED ON: 9-FEB-83 16:24:59
TESTED: 6/17/83 10:56:11   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S

** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

DIGITIZER PASSED ALL TESTS

UUT PROGRAM: FPSST.IC   COMPILED ON: 25-OCT-82 10:10:48
TESTED: 6/17/83 10:59:14   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DBL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

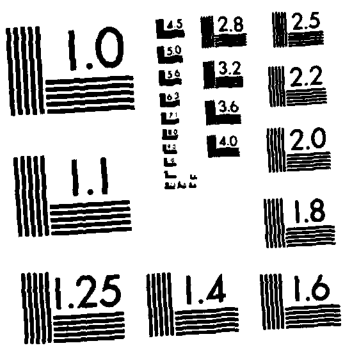
C A L I B R A T I O N   S T A T U S

** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

FIXED POWER SUPPLIES PASSED ALL TESTS.

AD-A134 296 E/O (ELECTROOOPTICAL) AUGMENTATION ENVIRONMENTAL TEMPERATURE TEST(U) MARTIN MARIETTA AEROSPACE ORLANDO FL A PAPKE SEP 83 OR-17385 DAAK50-82-G-0002

UNCLASSIFIED F/G 20/6 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

```
UUT PROGRAM: PPSST.1C              COMPILED ON:  10-DEC-82 13:18:43
TESTED:  8/17/83 11:0:30                  USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --PGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                   C A L I B R A T I O N   S T A T U S
                           ** ORIGINAL SYSTEM CAL APPLIED
                           ** MEAS CAL APPLIED
                           ** STIM CAL APPLIED
                           NO RF STATION CAL APPLIED

 LEAD RESISTANCE =  3.058

        PROGRAMMABLE POWER SUPPLIES PASSED ALL TESTS
```

```
UUT PROGRAM: RSST.IC                 COMPILED ON:  10-JAN-83 8:37:32
TESTED:  8/17/83 11:8:40                   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                C A L I B R A T I O N   S T A T U S
                     ** ORIGINAL SYSTEM CAL APPLIED
                     ** MEAS CAL APPLIED
                     ** STIM CAL APPLIED
                     NO RF STATION CAL APPLIED


     RESOLVER SIMULATOR PASSED ALL TESTS
```

UUT PROGRAM: PPGTST.IC COMPILED ON: 25-OCT-82 10:12:42
TESTED: 8/17/83 11:13:34 USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

PROGRAMMABLE PULSE GENERATOR PASSED ALL TESTS

```
UUT PROGRAM: VSGST.1C                    COMPILED ON:  13-JAN-83 6:52:14
TESTED:  6/17/83 11:16:30                     USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07


                     C A L I B R A T I O N   S T A T U S
                             ** ORIGINAL SYSTEM CAL APPLIED
                             ** MEAS CAL APPLIED
                             ** STIM CAL APPLIED
                             NO RF STATION CAL APPLIED

TEST OF 525 LINE RATE VIDEO SYNC SIGNAL
TEST OF 875 LINE RATE VIDEO SYNC SIGNAL
TEST OF COMPOSITE VIDEO WITHOUT SINE WAVE
TEST OF COMPOSITE VIDEO WITH SINE WAVE
TEST OF CAMERA SYNC SIGNALS
 INVERTED CAMERA SYNC TIMING ERROR.
-CROSS = 557.6  +CROSS = 634.5
-CROSS = 1297.5  +CROSS = 1469.6
-CROSS = 0.0  +CROSS = 0.0
 CAMERA SYNC SIGNAL TIMING IN ERROR.
+CROSS = 558.6  -CROSS = 635.5
+CROSS = 1298.5  -CROSS = 1470.6
+CROSS = 0.0  -CROSS = 0.0
TEST OF CVIDEO SIGNAL


VIDEO SIGNAL GENERATOR FAILED 2 TEST(S).
```

```
UUT PROGRAM: VSGST.1C                    COMPILED ON:  13-JAN-83 6:52:14
TESTED:  8/17/83 11:21:39                        USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                         C A L I B R A T I O N   S T A T U S
                                 ** ORIGINAL SYSTEM CAL APPLIED
                                 ** MEAS CAL APPLIED
                                 ** STIM CAL APPLIED
                                 NO RF STATION CAL APPLIED

TEST OF 525 LINE RATE VIDEO SYNC SIGNAL
TEST OF 875 LINE RATE VIDEO SYNC SIGNAL
TEST OF COMPOSITE VIDEO WITHOUT SINE WAVE
TEST OF COMPOSITE VIDEO WITH SINE WAVE
TEST OF CAMERA SYNC SIGNALS
 INVERTED CAMERA SYNC TIMING ERROR.
-CROSS = 558.5  +CROSS = 635.4
-CROSS = 1298.5  +CROSS = 1470.5
-CROSS = 0.0  +CROSS = 0.0
 CAMERA SYNC SIGNAL TIMING IN ERROR.
+CROSS = 558.5  -CROSS = 635.5
+CROSS = 1298.4  -CROSS = 1470.5
+CROSS = 0.0  -CROSS = 0.0
TEST OF CVIDEO SIGNAL


VIDEO SIGNAL GENERATOR FAILED 2 TEST(S).
```

```
UUT PROGRAM: OSADAF.IL              COMPILED ON:  25-OCT-82 10:13:41
TESTED:  8/17/83 11:26:45                   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --CGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                   C A L I B R A T I O N   S T A T U S
                             ** ORIGINAL SYSTEM CAL APPLIED
                             ** MEAS CAL APPLIED
                             ** STIM CAL APPLIED
                             NO RF STATION CAL APPLIED

WARNING, 10486 MESSAGE: 40

      OSA FILTER PASSED ALL TESTS
```

UUT PROGRAM: USADAS.IC   COMPILED ON: 25-OCT-82 10:14:6
TESTED: 6/17/83 11:26:21   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S

** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

WARNING, I0466 MESSAGE: 40

USA SHUTTER PASSED ALL TESTS

UUT PROGRAM: UAFOCCS.1C COMPILED ON: 24-NOV-82 9:6:42
TESTED: 8/17/83 11:29:57 USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

USA FOCUS PASSED ALL TESTS

```
UUT PROGRAM: PMILED.IL              COMPILED ON:  25-OCT-82 10:14:51
TESTED:  8/17/85 11:30:54                    USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                         ** ORIGINAL SYSTEM CAL APPLIED
                         ** MEAS CAL APPLIED
                         ** STIM CAL APPLIED
                         NO RF STATION CAL APPLIED


      AMBIENT TEMP = 17.00  PMT TEMP = 17.00
      REPLACE PMT COOLER OR PMT COOLER CONTROLLER
```

```
UUT PROGRAM: FMTLED.IC              COMPILED ON:  25-OCT-82 10:14:51
TESTED:  6/17/83 11:31:37                  USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 15-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                 C A L I B R A T I O N   S T A T U S
                      ** ORIGINAL SYSTEM CAL APPLIED
                      ** MEAS CAL APPLIED
                      ** STIM CAL APPLIED
                      NO RF STATION CAL APPLIED

     AMBIENT TEMP = 16.97  PMT TEMP = 16.97
     REPLACE PMT COOLER OR PMT COOLER CONTROLLER
```

UUT PROGRAM: IVDST.IC   COMPILED ON: 24-NOV-82 12:38:50
TESTED: 8/17/83 11:36:3   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DBL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S

** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

RLD RESISTANCE = 3.04
IVD PASSED ALL TESTS.

```
UUT PROGRAM: USGUUF.IL          COMPILED ON:  25-OCT-82 10:16:18
TESTED:  6/17/83 11:43:40                  USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                         ** ORIGINAL SYSTEM CAL APPLIED
                         ** MEAS CAL APPLIED
                         ** STIM CAL APPLIED
                         NO RF STATION CAL APPLIED


        USG FILTER PASSED ALL TESTS
```

UUT PROGRAM: USGUGF.IC   COMPILED ON: 25-OCT-82 10:16:41
TESTED: 6/17/83 11:44:11   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --UGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S

** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

USG MIRROR PASSED ALL TESTS

```
UUT PROGRAM: USGDGA.IC            COMPILED ON:  25-OCT-82 10:17:5
TESTED:  8/17/83 11:44:44                  USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                  C A L I B R A T I O N   S T A T U S
                          ** ORIGINAL SYSTEM CAL APPLIED
                          ** MEAS CAL APPLIED
                          ** STIM CAL APPLIED
                          NO RF STATION CAL APPLIED


      USG DIFF/FILTER PASSED ALL TESTS

SEVERE ERROR, FILE DOES NOT EXIST: UAGUGL.IC
```

```
UUT PROGRAM: USGUGL.IC              COMPILED ON:  6-DEC-82 13:27:5
TESTED:  6/17/83 11:46:23                   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --UGL 2.10 15-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                 C A L I B R A T I O N   S T A T U S
                      ** ORIGINAL SYSTEM CAL APPLIED
                      ** MEAS CAL APPLIED
                      ** STIM CAL APPLIED
                      NO RF STATION CAL APPLIED


                 USG LAMP PASSED ALL TESTS
```

UUT PROGRAM: DCDCS.IC COMPILED ON: 25-OCT-82 10:17:56
TESTED: 8/17/83 11:46:17 USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S

** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

DC SHUTTER PASSED ALL TESTS

UUT PROGRAM: DCAMIR.IC COMPILED ON: 24-NOV-82 8:50:47
TESTED: 8/17/83 11:46:50 USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

DC A MIRROR PASSED ALL TESTS

```
UUT PROGRAM: DCDCTL.IL                COMPILED ON:  6-DEC-82 13:43:24
TESTED:  6/17/83 12:1:25                        USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                            ** ORIGINAL SYSTEM CAL APPLIED
                            ** MEAS CAL APPLIED
                            ** STIM CAL APPLIED
                            NO RF STATION CAL APPLIED


          DC INTERNAL LAMP PASSED ALL TESTS
```

```
UUT PROGRAM: DCEXSC.IC          COMPILED ON:  6-DEC-82 13:44:56
TESTED:  6/17/83 12:5:56                  USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 15-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                         ** ORIGINAL SYSTEM CAL APPLIED
                         ** MEAS CAL APPLIED
                         ** STIM CAL APPLIED
                         NO RF STATION CAL APPLIED


                    DC EX SOURCE/TARGET PASSED ALL TESTS
```

UUT PROGRAM: DCFOCUS.JC COMPILED ON: 24-NOV-82 8:59:17
TESTED: 8/17/83 12:8:10 USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

DC FOCUS PASSED ALL TESTS

```
UUT PROGRAM: PMILED.IC              COMPILED ON:  25-OCT-82 10:14:51
TESTED:  6/17/83 12:59:40                   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07


                   C A L I B R A T I O N   S T A T U S
                         ** ORIGINAL SYSTEM CAL APPLIED
                         ** MEAS CAL APPLIED
                         ** STIM CAL APPLIED
                         NO RF STATION CAL APPLIED


     AMBIENT TEMP = 17.80  PMT TEMP = 17.80
     REPLACE PMT COOLER OR PMT COOLER CONTROLLER
```

```
UUT PROGRAM: DCVARF.IC             COMPILED ON:  25-OCT-82 10:19:52
TESTED:  6/17/83 13:33:59                  USING SYSTEM IADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                 C A L I B R A T I O N   S T A T U S
                            ** ORIGINAL SYSTEM CAL APPLIED
                            ** MEAS CAL APPLIED
                            ** STIM CAL APPLIED
                            NO RF STATION CAL APPLIED


                    DC VARIABLE FILTER PASSED ALL TESTS
```

UUT PROGRAM: EXTRAC.IC   COMPILED ON: 25-OCT-82 10:20:15
TESTED: 6/17/83 13:56:5   USING SYSTEM TADS/FNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S

** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

EXTERNAL RADIOMETER PASSED ALL TESTS

```
UUT PROGRAM: DCBMIR.IC            COMPILED ON:  24-NOV-82 8:51:56
TESTED:  8/17/83 13:39:43                USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                          ** ORIGINAL SYSTEM CAL APPLIED
                          ** MEAS CAL APPLIED
                          ** STIM CAL APPLIED
                          NO RF STATION CAL APPLIED


      DC B MIRROR PASSED ALL TESTS
```

```
UUT PROGRAM: DCINICAM.IC                    COMPILED ON:  6-DEC-82 13:27:35
TESTED:  8/17/83 13:47:6                    USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --UGL 2.10 15-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                          ** ORIGINAL SYSTEM CAL APPLIED
                          ** MEAS CAL APPLIED
                          ** STIM CAL APPLIED
                          NO RF STATION CAL APPLIED


                    DC INTERNAL CAMERA PASSED ALL TESTS

SEVERE ERROR, FILE DOES NOT EXIST: EXTCAM.IC
```

UUT PROGRAM: DCEXTCAM.IC   COMPILED ON: 27-OCT-82 14:6:14
TESTED: 6/17/83 13:51:6   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

DC EXTERNAL CAMERA PASSED ALL TESTS

```
UUT PROGRAM: DCLASER.IC          COMPILED ON:  2-DEC-82 11:32:26
TESTED:  6/17/83 13:54:26                 USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                          ** ORIGINAL SYSTEM CAL APPLIED
                          ** MEAS CAL APPLIED
                          ** STIM CAL APPLIED
                          NO RF STATION CAL APPLIED

SEVERE ERROR, I0468 FATAL ERROR:  RECV TIMEOUT
```

UUT PROGRAM: DCLASER.IC COMPILED ON: 2-DEC-82 11:32:26
TESTED: 6/17/83 13:57:11 USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --CGL 2.10 15-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

DC LASER PASSED ALL TESTS

```
UUT PROGRAM: INTRAD.IC                COMPILED ON:  25-OCT-82 10:22:9
TESTED:  6/17/85 13:59:2                      USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --UGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                         ** ORIGINAL SYSTEM CAL APPLIED
                         ** MEAS CAL APPLIED
                         ** STIM CAL APPLIED
                         NO RF STATION CAL APPLIED


                    INTERNAL RADIOMETER PASSED ALL TESTS
```

UUT PROGRAM: FIRCSST.IC   COMPILED ON: 25-OCT-82 10:22:33
TESTED: 8/17/83 14:2:41   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S

** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

FIR SHUTTER PASSED ALL TESTS

UUT PROGRAM: FIRCTGST.IC   COMPILED ON: 24-NOV-82 9:5:32
TESTED: 8/17/83 14:3:37   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 15-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

FIR TARGET PASSED ALL TESTS

```
UUT PROGRAM: FIRCAST.1C            COMPILED ON:  24-NOV-82 9:4:27
TESTED:  8/17/83 14:5:30                    USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                         ** ORIGINAL SYSTEM CAL APPLIED
                         ** MEAS CAL APPLIED
                         ** STIM CAL APPLIED
                         NO RF STATION CAL APPLIED


     FIR APERTURE PASSED ALL TESTS
```

```
UUT PROGRAM: FCBORE.IC          COMPILED ON:  2-DEC-82 10:10:21
TESTED:  6/17/83 14:6:34                  USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07


                 C A L I B R A T I O N   S T A T U S
                      ** ORIGINAL SYSTEM CAL APPLIED
                      ** MEAS CAL APPLIED
                      ** STIM CAL APPLIED
                      NO RF STATION CAL APPLIED

0.22980    -0.14465

        FIR BORESIGHT PASSED ALL TESTS
```

```
UUT PROGRAM: AUGTEM.IC            COMPILED ON:  9-DEC-82 11:39:28
TESTED:  8/17/83 14:8:14                 USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DEL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07


                    C A L I B R A T I O N   S T A T U S
                              ** ORIGINAL SYSTEM CAL APPLIED
                              ** MEAS CAL APPLIED
                              ** STIM CAL APPLIED
                              NO RF STATION CAL APPLIED

AMBIENT TEMPERATURE = 35.64 DEG C FROM NIGHTSIDE

          ERROR ON DC SENSOR TEMPERATURE 1  TEMPERATURE READS 25.81

          ERROR ON DC SENSOR TEMPERATURE 3  TEMPERATURE READS 26.24
DRA SOURCE B IN ERROR
       TEMPERATURE READS  36.58 AND SHOULD READ 35.00

       FIR TEMPERATURE SENSOR PASSED ALL TESTS
```

```
UUT PROGRAM: ACGTEM.IC                COMPILED ON:  9-DEC-82 11:39:28
TESTED:  6/15/83 17:14:28                   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DCL 2.10 15-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                    C A L I B R A T I O N   S T A T U S
                             ** ORIGINAL SYSTEM CAL APPLIED
                             ** MEAS CAL APPLIED
                             ** STIM CAL APPLIED
                             NO RF STATION CAL APPLIED

SEVERE ERROR, HARDWARE SHUTDOWN DUE TO OPERATOR ABORT.
```

```
UUT PROGRAM: AUGTEF.IC                 COMPILED ON:  9-DEC-82 11:39:28
TESTED:  2/17/83 14:23:21                     USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                  C A L I B R A T I O N   S T A T U S
                        ** ORIGINAL SYSTEM CAL APPLIED
                        ** MEAS CAL APPLIED
                        ** STIM CAL APPLIED
                        NO RF STATION CAL APPLIED

HAND HELD TEMPERATURE PROBE HIGH TEMP TEST SKIPPED
HAND HELD TEMPERATURE PROBE LOW TEMP TEST SKIPPED
AMBIENT TEMPERATURE = 35.72 DEG C FROM NIGHTSIDE

        ERROR ON DC SENSOR TEMPERATURE 1  TEMPERATURE READS 26.24

        ERROR ON DC SENSOR TEMPERATURE 3  TEMPERATURE READS 26.68

      FIR TEMPERATURE SENSOR PASSED ALL TESTS

      FIR TEMPERATURE CONTROLLER (DBA) PASSED ALL TESTS
```

UUT PROGRAM: BITCHECK.1C COMPILED ON: 9-DEC-82 14:18:17
TESTED: 8/17/83 14:34:1 USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

ALL BITS PASSED TEST

```
UUT PROGRAM: LASERST.IC              COMPILED ON:  1-DEC-82 14:40:0
TESTED:  8/17/83 14:37:13                   USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION:  6.07

                      C A L I B R A T I O N   S T A T U S
                               ** ORIGINAL SYSTEM CAL APPLIED
                               ** MEAS CAL APPLIED
                               ** STIM CAL APPLIED
                               NO RF STATION CAL APPLIED

RLD RESISTANCE =  3.04

*** LASER INTERLOCK & POWER CHECK PASSED ALL TESTS ***
```

Temp Tapes High Temp Demo

17	81.2	°F
16	83.3	°F
15	86.4	°F
14	79.6	°F
13	96.4	°F
12	92.2	°F
11	66.2	°F
10	85.5	°F
9	84.9	°F
8	66.1	°F
7	83.7	°F
6	87.4	°F
5	79.6	°F
4	84.4	°F
3	****.*	°F
2	84.6	°F
1	84.4	°F
0	66.3	°F

000001
228:11:18:27

17	84.7	°F
16	85.4	°F
15	65.0	°F
14	80.0	°F
13	97.0	°F
12	91.1	°F
11	65.0	°F
10	87.5	°F
9	96.5	°F
8	68.1	°F
7	88.9	°F
6	90.6	°F
5	83.9	°F
4	87.3	°F
3	****.*	°F
2	89.5	°F
1	86.7	°F
0	68.3	°F

000001
228:11:48:27

17	86.9	°F
16	87.0	°F
15	86.6	°F
14	79.8	°F
13	97.0	°F
12	90.4	°F
11	65.9	°F
10	88.7	°F
9	87.9	°F
8	70.4	°F
7	90.6	°F
6	91.4	°F
5	95.9	°F
4	98.6	°F
3	****.*	°F
2	91.0	°F
1	90.2	°F
0	70.5	°F

000001
228:12:18:27

17	67.3	°F
16	87.5	°F
15	89.5	°F
14	79.9	°F
13	96.3	°F
12	90.5	°F
11	72.2	°F
10	89.3	°F
9	85.2	°F
8	72.6	°F
7	91.5	°F
6	92.1	°F
5	87.6	°F
4	86.7	°F
3	****.*	°F
2	91.7	°F
1	90.9	°F
0	72.5	°F

000001
228:12:48:27

17	88.5	°F
16	87.5	°F
15	89.0	°F
14	80.0	°F
13	95.9	°F
12	91.5	°F
11	74.2	°F
10	89.4	°F
9	90.0	°F
8	74.7	°F
7	92.0	°F
6	90.1	°F
5	[illegible]	°F
4	[illegible]	°F
3	****.*	°F
2	92.3	°F
1	89.6	°F
0	74.4	°F

000001
228:13:18:27

17	98.9	°F
16	67.8	°F

17	90.0	°F
16	87.5	°F
15	89.7	°F
14	79.6	°F
13	96.4	°F
12	91.9	°F
11	76.1	°F
10	88.8	°F
9	96.4	°F
8	76.5	°F
7	92.4	°F
6	92.5	°F
5	89.1	°F
4	[illegible]	°F
3	****.*	°F
2	[illegible]	°F
1	91.4	°F
0	75.9	°F

000001
228:13:48:27

High Temp Dome

17	88.6	°F
16	87.5	°F
15	89.3	°F
14	79.8	°F
13	97.0	°F
12	90.2	°F
11	76.8	°F
10	89.1	°F
9	89.5	°F
8	77.2	°F
7	92.5	°F
6	92.5	°F
5	89.4	°F
4	89.4	°F
3	****.*	°F
2	92.6	°F
1	91.7	°F
0	76.5	°F

00000.
228:13:59:14

17	89.1	°F
16	88.4	°F
15	90.4	°F
14	80.2	°F
13	97.1	°F
12	91.5	°F
11	78.1	°F
10	90.7	°F
9	89.5	°F
8	79.2	°F
7	92.8	°F
6	93.1	°F
5	89.7	°F
4	90.1	°F
3	****.*	°F
2	93.0	°F
1	90.1	°F
0	77.4	°F

00000.
228:14:19:27

17	90.2	°F
16	80.5	°F
15	90.5	°F
14	79.9	°F
13	96.8	°F
12	91.0	°F
11	79.6	°F
10	89.5	°F
9	89.7	°F
8	79.8	°F
7	92.7	°F
6	93.0	°F
5	90.1	°F
4	90.1	°F
3	****.*	°F
2	92.9	°F
1	91.2	°F
0	76.6	°F

00000.
228:14:43:27

17	87.6	°F
16	96.0	°F
15	89.3	°F
14	80.6	°F
13	96.4	°F
12	91.7	°F
11	81.0	°F
10	87.3	°F
9	89.0	°F
8	91.0	°F
7	91.4	°F
6	86.4	°F
5	89.5	°F
4	88.8	°F
3	****.*	°F
2	92.8	°F
1	87.7	°F
0	79.7	°F

00000.
228:15:16:0[illegible]

17	86.9	°F
16	96.2	°F
15	98.0	°F
14	79.9	°F
13	97.0	°F
12	91.3	°F
11	83.0	°F
10	87.3	°F
9	89.3	°F
8	83.3	°F
7	90.0	°F
6	87.9	°F
5	98.8	°F
4	88.7	°F
3	****.*	°F
2	91.0	°F
1	87.9	°F
0	81.3	°F

00000.
228:16:46:10

17	86.6	°F
16	85.3	°F
15	87.1	°F
14	80.9	°F
13	96.2	°F
12	91.3	°F
11	84.5	°F
10	86.4	°F
9	88.0	°F
8	84.4	°F
7	95.2	°F
6	87.6	°F
5	87.6	°F
4	87.8	°F
3	****.*	°F
2	89.4	°F
1	86.3	°F
0	82.2	°F

00000.
228:15:15:0[illegible]

High Temp Demo

17	86.7	°F
16	86.2	°F
15	86.2	°F
14	81.7	°F
13	97.1	°F
12	90.7	°F
11	85.5	°F
10	86.0	°F
9	86.4	°F
8	95.1	°F
7	88.9	°F
6	88.6	°F
5	88.2	°F
4	85.3	°F
3	*****	°F
2	89.5	°F
1	88.0	°F
0	83.1	°F

000000
228:19:46:09

17	87.1	°F
16	86.2	°F
15	89.2	°F
14	81.5	°F
13	97.0	°F
12	90.0	°F
11	86.2	°F
10	87.6	°F
9	88.4	°F
8	85.7	°F
7	89.0	°F
6	88.4	°F
5	88.7	°F
4	88.3	°F
3	*****	°F
2	89.4	°F
1	87.4	°F
0	83.6	°F

009000
228:21:16:09

17	86.9	°F
16	85.5	°F
15	87.6	°F
14	80.2	°F
13	96.2	°F
12	90.0	°F
11	86.6	°F
10	87.1	°F
9	89.3	°F
8	86.1	°F
7	88.3	°F
6	86.8	°F
5	87.6	°F
4	87.5	°F
3	*****	°F
2	89.1	°F
1	87.2	°F
0	84.1	°F

000000
228:22:46:10

17	88.2	°F
16	86.2	°F
15	88.0	°F

17	86.9	°F
16	85.5	°F
15	87.5	°F
14	80.8	°F
13	96.1	°F
12	93.5	°F
11	86.9	°F
10	87.3	°F
9	88.0	°F
8	86.3	°F
7	88.4	°F
6	87.6	°F
5	88.0	°F
4	87.6	°F
3	*****	°F
2	89.2	°F
1	86.9	°F
0	84.4	°F

000000
229:00:16:09

17	86.7	°F
16	85.5	°F
15	87.5	°F
14	80.8	°F
13	95.7	°F
12	90.8	°F
11	87.0	°F
10	87.0	°F
9	87.7	°F
8	86.5	°F
7	89.0	°F
6	88.9	°F
5	88.0	°F
4	87.6	°F
3	*****	°F
2	88.9	°F
1	87.1	°F
0	84.5	°F

000000
229:01:46:09

17	87.4	°F
16	86.0	°F
15	88.4	°F
14	80.9	°F
13	96.8	°F
12	92.6	°F
11	87.0	°F
10	88.0	°F
9	88.8	°F
8	86.6	°F
7	88.7	°F
6	87.5	°F
5	89.5	°F
4	88.6	°F
3	*****	°F
2	89.9	°F
1	87.9	°F
0	84.[illegible]	°F

000000
229:03:16:09

High Temp Demo

Channel	229:04:12:14	229:04:46:09	229:06:16:09	229:07:46:09	229:09:16:09	229:10:46:09
17	88.5 F	90.7 F	92.2 F	92.6 F	91.2 F	92.0 F
16	86.3 F	88.8 F	90.4 F	89.9 F	88.8 F	89.6 F
15	82.7 F	89.6 F	92.1 F	90.7 F	88.8 F	92.1 F
14	80.7 F	91.0 F	90.[illegible] F	79.6 F	90.3 F	90.2 F
13	87.0 F	97.0 F	95.4 F	97.0 F	95.9 F	96.7 F
12	92.2 F	92.3 F	91.1 F	90.0 F	90.7 F	90.7 F
11	87.3 F	87.7 F	89.0 F	90.1 F	90.5 F	91.0 F
10	88.3 F	89.5 F	91.6 F	90.9 F	89.5 F	90.9 F
9	88.6 F	90.4 F	91.7 F	91.5 F	91.3 F	90.4 F
8	86.6 F	86.9 F	88.6 F	90.0 F	90.7 F	91.2 F
7	88.4 F	92.9 F	95.5 F	95.1 F	93.8 F	93.[illegible] F
6	89.9 F	93.1 F	95.0 F	94.3 F	93.3 F	94.[illegible] F
5	88.5 F	90.7 F	93.2 F	93.4 F	92.2 F	93.2 F
4	88.1 F	90.3 F	92.0 F	91.6 F	90.0 F	91.6 F
3	***** F	***** F	***** F	***** F	***** F	***** F
2	88.4 F	93.0 F	95.5 F	94.[illegible] F	93.8 F	93.6 F
1	87.9 F	91.2 F	93.2 F	93.0 F	93.8 F	93.3 F
0	85.0 F	95.4 F	87.3 F	88.[illegible] F	89.0 F	89.3 F

High Temp Demo

17	91.7	F
16	85.5	F
15	91.1	F
14	79.5	F
13	97.2	F
12	91.0	F
11	91.0	F
10	91.1	F
9	91.5	F
8	91.3	F
7	93.9	F
6	94.0	F
5	93.3	F
4	91.9	F
3	*****	F
2	93.6	F
1	93.6	F
0	89.3	F

229:10:50:38

17	91.7	F
16	86.6	F
15	91.5	F
14	79.6	F
13	96.9	F
12	91.7	F
11	91.0	F
10	91.0	F
9	90.3	F
8	91.3	F
7	94.0	F
6	94.1	F
5	93.5	F
4	91.6	F
3	*****	F
2	93.7	F
1	93.4	F
0	89.3	F

229:11:20:39

17	92.0	F
16	88.6	F
15	91.3	F
14	79.9	F
13	97.1	F
12	91.2	F
11	91.2	F
10	90.5	F
9	90.0	F
8	91.5	F
7	93.5	F
6	94.0	F
5	93.5	F
4	92.0	F
3	*****	F
2	93.5	F
1	93.2	F
0	89.4	F

229:11:50:39

17	90.9	F
16	89.1	F
15	91.3	F
14	80.1	F
13	97.5	F
12	91.5	F
11	90.4	F
10	90.5	F
9	91.5	F
8	91.5	F
7	93.9	F
6	93.4	F
5	93.5	F
4	92.0	F
3	*****	F
2	93.6	F
1	93.3	F
0	89.5	F

229:12:20:39

17	90.6	F
16	88.3	F
15	90.2	F
14	80.0	F
13	96.8	F
12	91.6	F
11	91.1	F
10	90.1	F
9	90.9	F
8	91.5	F
7	93.5	F
6	93.7	F
5	93.3	F
4	93.1	F
3	*****	F
2	93.2	F
1	93.2	F
0	89.5	F

229:12:50:39

17	91.6	F
16	88.4	F
15	91.0	F
14	79.3	F
13	96.4	F
12	91.9	F
11	91.3	F
10	90.5	F
9	90.8	F
8	91.6	F
7	93.4	F
6	93.6	F
5	93.1	F
4	91.1	F
3	*****	F
2	93.2	F
1	93.0	F
0	[illegible]	F

229:13:[illegible]

High Temp Ovens

17	899	F

17	916	F
16	883	F
15	904	F
14	804	F
13	975	F
12	912	F
11	915	F
10	905	F
9	911	F
8	916	F
7	937	F
6	937	F
5	932	F
4	914	F
3	*****	F
2	935	F
1	935	F
0	896	F

000000
229:13:50:39

17	895	F
16	866	F
15	887	F
14	901	F
13	961	F
12	891	F
11	914	F
10	881	F
9	897	F
8	916	F
7	899	F
6	912	F
5	912	F
4	895	F
3	*****	F
2	898	F
1	906	F
0	894	F

000000
229:14:20:39

17	895	F
16	977	F
15	923	F
14	795	F
13	970	F
12	907	F
11	915	F
10	991	F
9	892	F
8	917	F
7	909	F
6	927	F
5	917	F
4	898	F
3	*****	F
2	909	F
1	911	F
0	894	F

00000
229:14:23:23

17	926	F
16	889	F
15	907	F
14	901	F
13	979	F
12	911	F
11	916	F
10	908	F
9	914	F
8	915	F
7	940	F
6	941	F
5	933	F
4	915	F
3	*****	F
2	935	F
1	937	F
0	897	F

000000
229:14:50:39

17	924	F
16	892	F
15	904	F
14	808	F
13	975	F
12	920	F
11	917	F
10	906	F
9	906	F
8	915	F
7	947	F
6	942	F
5	933	F
4	909	F
3	*****	F
2	947	F
1	941	F
0	897	F

000000
229:15:20:39

17	922	F
16	893	F
15	913	F
14	802	F
13	977	F
12	925	F
11	918	F
10	912	F
9	913	F
8	915	F
7	944	F
6	945	F
5	937	F
4	914	F
3	*****	F
2	941	F
1	943	F
0	897	F

000000
229:15:50:39

17	900	F
16	976	F
15	882	F
14	802	F
13	965	F
12	919	F
11	917	F
10	921	F
9	997	F
8	916	F
7	926	F
6	900	F
5	912	F
4	899	F
3	*****	F
2	934	F
1	887	F
0	893	F

000000
229:16:20:39

Check Sum Printout
8-11-83 ATP Tape

FILENAME: ADST.IC
BLOCKS READ: 40
CHECKSUM: 163730

FILENAME: AUGTEM.IC
BLOCKS READ: 16
CHECKSUM: 120754

FILENAME: BITCHECK.IC
BLOCKS READ: 7
CHECKSUM: 153105

FILENAME: CALCST.IC
BLOCKS READ: 136
CHECKSUM: 101420

FILENAME: DCAMIR.IC
BLOCKS READ: 4
CHECKSUM: 104132

FILENAME: DCMFIR.IC
BLOCKS READ: 4
CHECKSUM: 071641

```
FILENAME:     DCDCS.IC
BLOCKS READ:      5
CHECKSUM:     127272

FILENAME:     DCDCTL.IC
BLOCKS READ:      5
CHECKSUM:     011622

FILENAME:     DCEXSU.IC
BLOCKS READ:      6
CHECKSUM:     016641

FILENAME:     DCEXTCAM.IC
BLOCKS READ:      6
CHECKSUM:     047770

FILENAME:     DCFOCUS.IC
BLOCKS READ:      3
CHECKSUM:     072542

FILENAME:     DCINTCAM.IC
BLOCKS READ:      4
CHECKSUM:     140340

FILENAME:     DCLASER.IC
BLOCKS READ:      3
CHECKSUM:     144607

FILENAME:     DCVARF.IC
BLOCKS READ:      3
CHECKSUM:     107217

FILENAME:     DIGITST.IC
BLOCKS READ:     14
CHECKSUM:     167667

FILENAME:     EXTRAD.IC
BLOCKS READ:      7
CHECKSUM:     057355

FILENAME:     FCBORE.IC
BLOCKS READ:      7
CHECKSUM:     005015

FILENAME:     FIRCAST.IC
BLOCKS READ:      4
CHECKSUM:     172170

FILENAME:     FIRCSST.IC
BLOCKS READ:      4
CHECKSUM:     173121

FILENAME:     FIRCTGST.IC
BLOCKS READ:      4
CHECKSUM:     114523

FILENAME:     FPSST.IC
BLOCKS READ:      7
CHECKSUM:     174134

FILENAME:     INTRAD.IC
BLOCKS READ:      5
```

```
CHECKSUM:      070415

FILENAME:      IVEST.IC
BLOCKS READ:     42
CHECKSUM:      154141

FILENAME:      LASERST.IC
BLOCKS READ:     32
CHECKSUM:      077612

FILENAME:      MTRXSW.IC
BLOCKS READ:     19
CHECKSUM:      041646

FILENAME:      OAFOCUS.IC
BLOCKS READ:      2
CHECKSUM:      054524

FILENAME:      OSADAF.IC
BLOCKS READ:      4
CHECKSUM:      130247

FILENAME:      OSADAS.IC
BLOCKS READ:      5
CHECKSUM:      006452

FILENAME:      OSGOGA.IC
BLOCKS READ:      4
CHECKSUM:      004137

FILENAME:      OSGOGF.IC
BLOCKS READ:      4
CHECKSUM:      136222

FILENAME:      OSGOGL.IC
BLOCKS READ:      6
CHECKSUM:      114022

FILENAME:      OSGOGM.IC
BLOCKS READ:      4
CHECKSUM:      104511

FILENAME:      PLLBUS.IC
BLOCKS READ:      3
CHECKSUM:      161303

FILENAME:      PMTLED.IC
BLOCKS READ:      6
CHECKSUM:      033103

FILENAME:      PPGTST.IC
BLOCKS READ:     13
CHECKSUM:      027375

FILENAME:      PPSST.IC
BLOCKS READ:     36
CHECKSUM:      025313

FILENAME:      RSST.IC
BLOCKS READ:      9
CHECKSUM:      030530

FILENAME:      VSGST.IC
```

BLOCKS READ: 23
CHECKSUM: 132271

READ ERROR AT BLOCK 61 OF FILE: ADST
Passed next try: See Following Sheet
Operator Error

FILENAME: ADST
BLOCKS READ: 61
CHECKSUM: 035170

FILENAME: BITCHECK
BLOCKS READ: 12
CHECKSUM: 025136

FILENAME: CALCST
BLOCKS READ: 101
CHECKSUM: 123334

FILENAME: DCAMIR
BLOCKS READ: 5
CHECKSUM: 021273

FILENAME: DCBMIR
BLOCKS READ: 5
CHECKSUM: 003170

FILENAME: DCDCS
BLOCKS READ: 6
CHECKSUM: 066400

FILENAME: DCDCTL
BLOCKS READ: 6
CHECKSUM: 141064

FILENAME: DCEXSU
BLOCKS READ: 6
CHECKSUM: 053746

FILENAME: DCEXTCAM
BLOCKS READ: 7
CHECKSUM: 063406

FILENAME: DCFOCUS
BLOCKS READ: 6
CHECKSUM: 161101

FILENAME: DCINTCAM
BLOCKS READ: 7
CHECKSUM: 022015

FILENAME: DCLASER
BLOCKS READ: 5
CHECKSUM: 162356

FILENAME: DCVARF
BLOCKS READ: 6
CHECKSUM: 152555

FILENAME: DIGITST
BLOCKS READ: 22
CHECKSUM: 113111

FILENAME: EXTRAD
BLOCKS READ: 10
CHECKSUM: 030575

FILENAME: FCBURE
BLOCKS READ: 10

```
CHECKSUM:      124524

FILENAME:      FIRCAST
BLOCKS READ:        5
CHECKSUM:      060120

FILENAME:      FIRCSST
BLOCKS READ:        5
CHECKSUM:      160365

FILENAME:      FIRCTGST
BLOCKS READ:        5
CHECKSUM:      163017

FILENAME:      FPSST
BLOCKS READ:       10
CHECKSUM:      152346

FILENAME:      INIRAD
BLOCKS READ:        6
CHECKSUM:      122515

FILENAME:      IVDST
BLOCKS READ:       60
CHECKSUM:      130010

FILENAME:      LASERST
BLOCKS READ:       43
CHECKSUM:      150623

FILENAME:      MTRXSW
BLOCKS READ:       26
CHECKSUM:      103767

FILENAME:      OAFOCUS
BLOCKS READ:        5
CHECKSUM:      007020

FILENAME:      OSADAF
BLOCKS READ:        5
CHECKSUM:      064370

FILENAME:      OSADAS
BLOCKS READ:        7
CHECKSUM:      175130

FILENAME:      OSGOGA
BLOCKS READ:        5
CHECKSUM:      166751

FILENAME:      OSGOGF
BLOCKS READ:        5
CHECKSUM:      045710
```

```
FILENAME:     USGUGL
BLOCKS READ:       7
CHECKSUM:     107706

FILENAME:     USGUGM
BLOCKS READ:       5
CHECKSUM:     010217

FILENAME:     FLLBUS
BLOCKS READ:       5
CHECKSUM:     062471

FILENAME:     PMTLED
BLOCKS READ:      10
CHECKSUM:     161313

FILENAME:     PFGTST
BLOCKS READ:      21
CHECKSUM:     120306

FILENAME:     PPSST
BLOCKS READ:      52
CHECKSUM:     155407

FILENAME:     RSST
BLOCKS READ:      13
CHECKSUM:     033532

FILENAME:     VSGST
BLOCKS READ:      32
CHECKSUM:     106116
```

APPENDIX A-3

OPTICAL TOOL CHARACTERISTICS

TEMP. CHARACTERIZATION/EZ8-082798C

DATE: August 15, 1983
TEST CONDUCTOR: Joel C. Tollefson

1.0 TEST EQUIPMENT

Item	Source
Traveling Microscope	---
Thermal Chamber	MMC
Test Stand (Invar)	MMC
Heat Gun	---
Temperature Probe	Kane May (EQ729493)
Optics Table	MMC

2.0 TEST PROCEDURE

2.1 Set up the test equipment per Figure 1. Cool the tool in the chamber to 65°F.

2.2 Procedure

2.2.1 Position the microscope such that the cross hair of the EZ8-082798C tool is aligned with the scope cross hair.

2.2.2 Record the microscope's reading as a reference measurement and using the temperature probe, measure the tool temperature. Record all data on the data sheet.

2.2.3 Bring the tool to temperature of 90°F.

2.2.4 Repeat procedure 2.2.1.

2.2.5 Record the microscope's reading and the tool temperature on the data sheet.

3.0 SUMMARY

3.1 Record on the data sheet the total linear deviation and the temperature for each test.

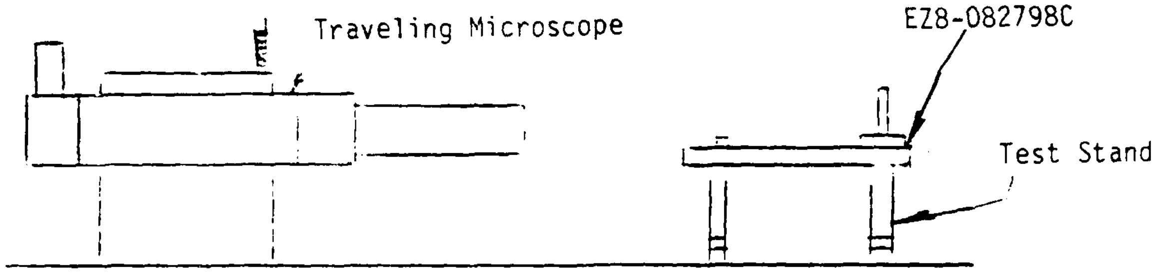


FIGURE 1 - Test Equipment Set-Up

DATA SHEET

	REFERENCE MEASUREMENT			HIGH TEMP. MEASUREMENT		
Test No.	Temp	Verticle	Horizontal	Temp	Verticle	Horizontal
1	65°F	.8031"	*	90°F	.8025"	*

DATA SUMMARY:

Test No.	ΔT	Measured Deviation	Measured Deviation
1	25°F	.0006"	*

*Deviation is too small to be measured, and therefore is deemed to be insignificant.

Joel C. Tollifson Aug. 15, 1983
Signature Date

TEMP. CHARACTERIZATION/EZ8-082800A TOOL

1.0 TEST EQUIPMENT

Item	P/N	Source
Auto collimator alignment scope	6D	Nikon
Temp. chamber	--	MMC
Data logger	2240C	Fluke
Thermocouple	Type E7	
Thermal source	S-1.2	Thermotron

2.0 TEST PROCEDURE

2.1 Test Set-Up

2.1.1 Set-up test equipment per Figure 1.

2.1.2 Attach 3 thermo couples to EZ8-082800ATOOL and 1 thermocouple to chamber interior. Record position of thermocouple on the data sheet.

2.2 Procedure

2.2.1 Focus scope of EZ8-082800A tool to infinity.

2.2.2 Low temp. 65° ±3°F

2.2.2.1 Position the alignment scope such that its reticle coincides with the EZ8-082800A reticle. Record any misalignment as a reference measurement on the data sheet.

2.2.3 High Temperature 90 ± 3°

2.2.3.1 Increase the chamber temperature to 90° ± 3°F and soak for 2 hours minimum or until temperatures stabilize.

2.2.3.2 View the EZ8-082800A reticle through the alignment scope and record the reticle deviation on the data sheet.

2.2.4 Record the total measured deviation on the data sheet.

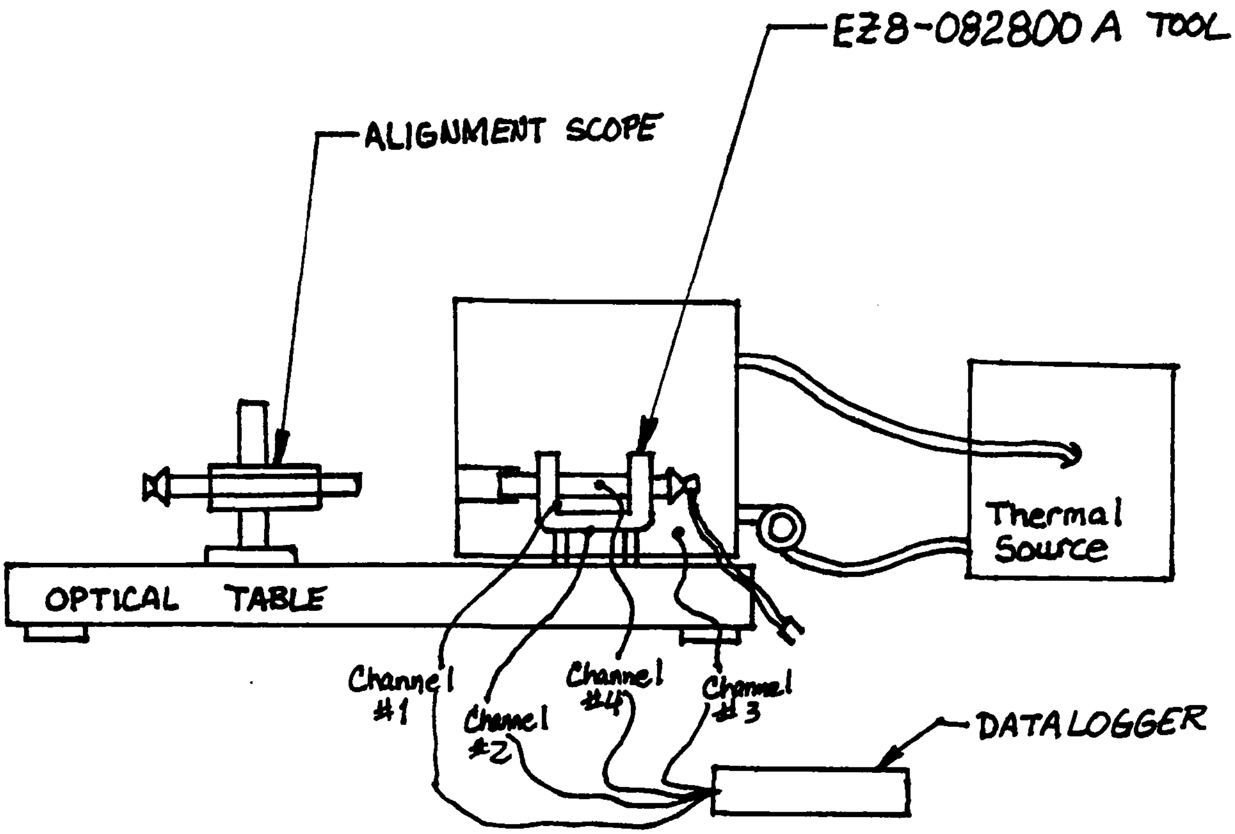

EZ8-082800 A TOOL
ALIGNMENT SCOPE
Thermal Source
OPTICAL TABLE
Channel #1
Channel #2
Channel #4
Channel #3
DATALOGGER

FIGURE 1

DATA SHEET

2.1.2 Thermocouple Position

Channel 1 - Base of the leg holding the end of the scope
Channel 2 - Near center of mounting base
Channel 3 - Chamber ambient position
Channel 4 - Center of scope

2.2.2.1 <u>Low Temp</u>.

Temp. 63.7°F
Reference Measurement: 10 secs.

2.2.3.1 <u>High Temp</u>.

Temp. 89.8°F
Measurement: 13 secs.

2.2.4 Total Measured Deviation

= 3 secs.

Temp Characterization/EZ8-082787A Tool

1.0 TEST EQUIPMENT

Item	P/N	Source
alignment scope	model 81	Brunson
stand	---	Nikon
adapters (scope to stand DIA)	---	MMC
temp. chamber	---	MMC
temp. sensors	---	MMC

2.0 Test Procedure

2.1 Test set-up per fig. 1

2.2 Procedure

2.2.1 Focus scope of EZ8-082787A tool to infinity.

2.2.2 Low temp. 65° ± 3°F

2.2.2.1 Position the alignment scope such that its reticle coincides with the EZ8-082787A reticle. Record any misalignment on the data sheet as a reference measurement.

2.2.3 High Temp. 90° ± 3°F

2.2.3.1 Increase the temp. chamber to 90° ± 3° and soak for 2 hrs. minimum, or until the temperatures stabilize.

2.2.3.2 View the EZ8-082787A reticle through the alignment telescope and record the reticle deviation on the data sheet.

2.2.4 Record the total measured deviation on the data sheet.

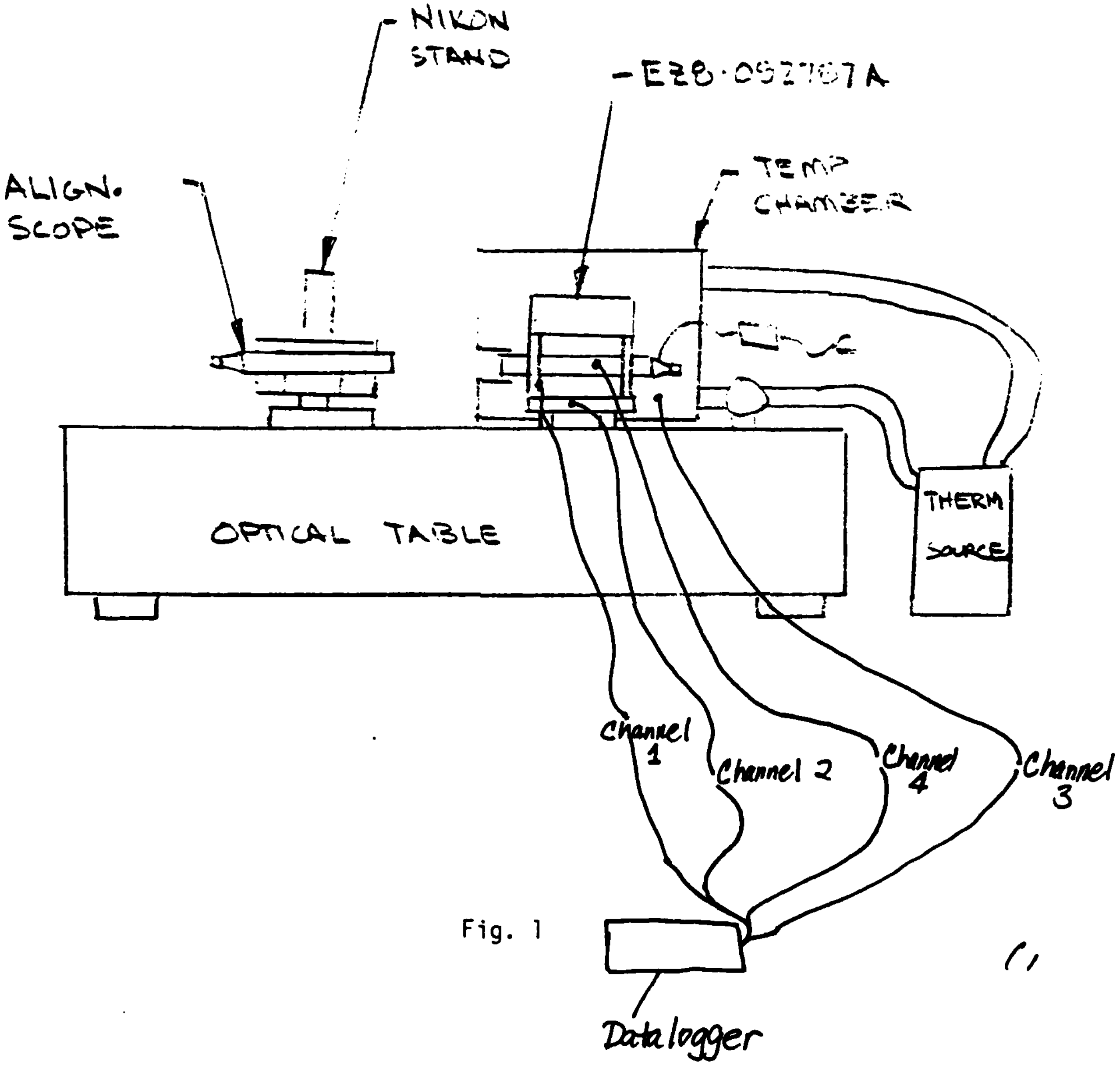

NIKON STAND
EZ8·052707A
ALIGN. SCOPE
TEMP CHAMBER
OPTICAL TABLE
THERM SOURCE
Channel 1
Channel 2
Channel 4
Channel 3
Datalogger

Fig. 1

DATA SHEET

2.1.2 Thermocouple Position

Channel 1 - Near scope, on the leg supporting end of scope

Channel 2 - on the 1" thk base

Channel 3 - in the chamber

Channel 4 - on the center of scope

2.2.2.1 Low Temp.

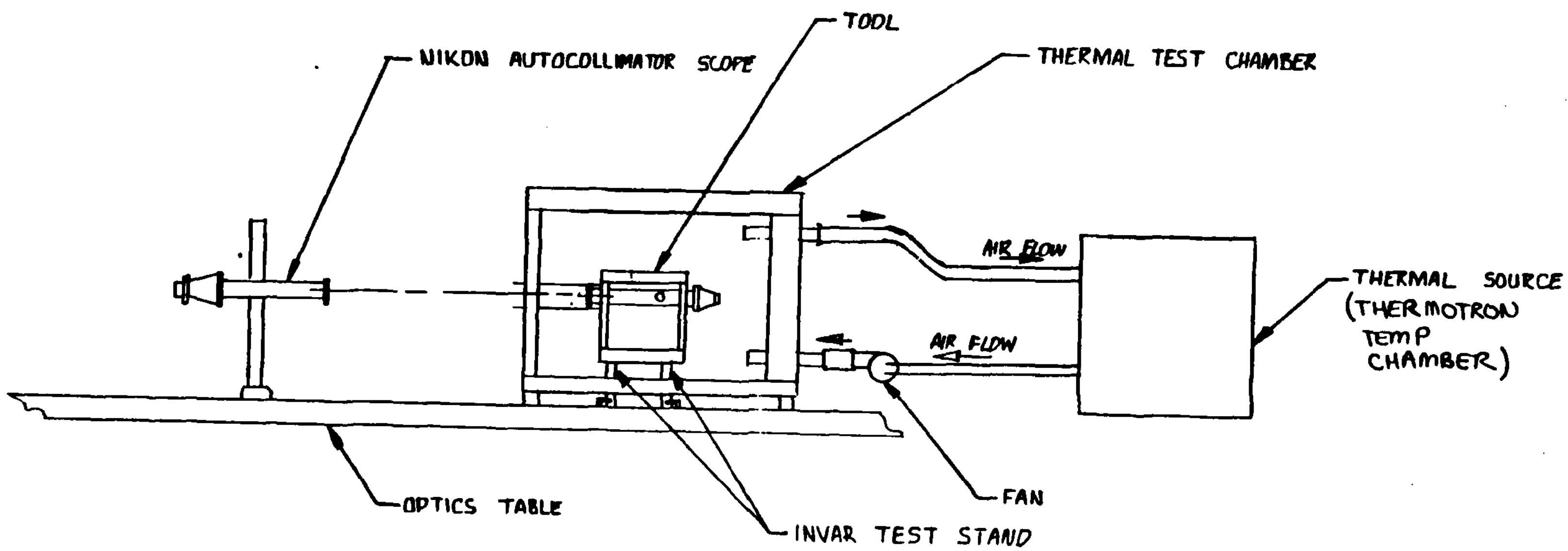
Temp. 64°F | Reference Measurement = 3.5 secs.

2.2.3.1 High Temp.

Temp. 91°F | Measurement = 1 sec.

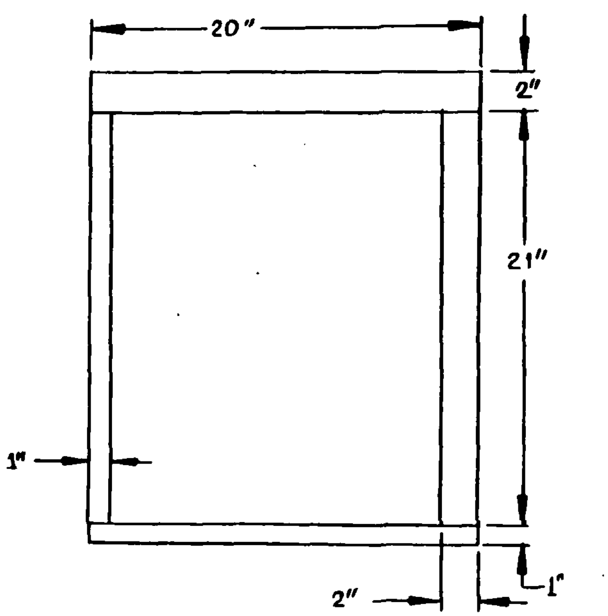
2.2.4 Total Measured Deviation = 2.5 secs

TEST SET-UP FOR TEMPERATURE CHARACTERIZATION OF TOOLS

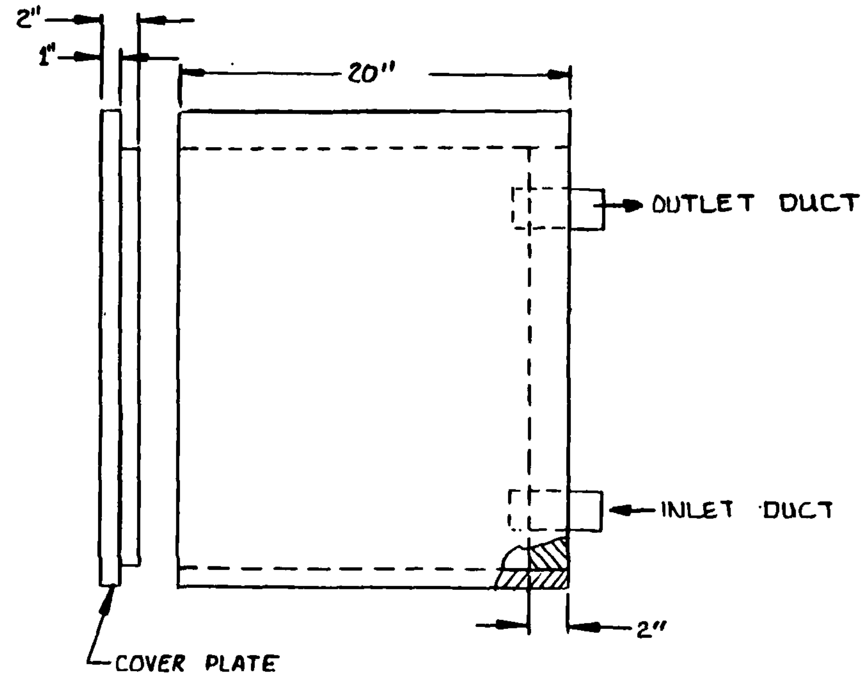


<u>THERMAL CHAMBER FOR TEMPERATURE CHARACTERIZATION OF TOOLS</u>

<u>MATERIAL</u>: CLOSED CELL STYROFOAM
DRAWING SCALE: 1/6

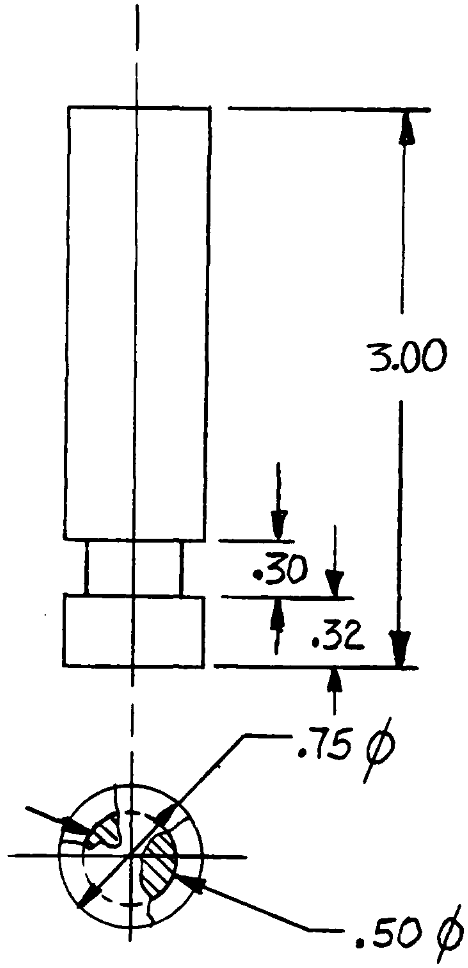


FRONT VIEW
(COVER PLATE REMOVED)



SIDE VIEW

154



TEST STAND

MATERIAL: INVAR
QUANTITY: 3

Sketch 001

Temp Profiles - Too Characterization

4	77.8	F
3	63.6	F
2	70.6	F
1	69.7	F

000000
188:16:02:12

Chamber Evaluation

4	78.2	F
3	63.8	F
2	74.4	F
1	74.2	F

000000
188:15:57:08

4	79.1	F
3	65.6	F
2	77.2	F
1	78.2	F

000000
188:15:53:59

000000
188:15:53:47

4	78.9	F

4	82.2	F
3	73.5	F
2	81.2	F
1	83.5	F

000000
188:15:50:07

4	79.2	F
3	67.3	F
2	66.0	F
1	66.1	F

000000
188:16:32:12

4	79.7	F
3	66.8	F
2	65.8	F
1	65.9	F

000000
188:16:27:12

4	79.7	F
3	66.2	F
2	65.8	F
1	65.7	F

000000
188:16:22:12

4	79.1	F
3	65.8	F
2	66.2	F
1	65.9	F

000000
188:16:17:12

4	78.8	F
3	65.1	F
2	67.0	F
1	66.2	F

000000
188:16:12:12

4	78.4	F
3	64.7	F
2	68.2	F
1	67.3	F

000000
188:16:07:12

4	80.2	F
3	69.5	F
2	67.9	F
1	68.3	F

000000
188:17:02:12

4	80.1	F
3	69.2	F
2	67.7	F
1	68.0	F

000000
188:16:57:12

4	79.8	F
3	68.8	F
2	67.3	F
1	67.7	F

000000
188:16:52:12

4	79.7	F
3	68.4	F
2	66.9	F
1	67.3	F

000000
188:16:47:12

4	79.4	F
3	68.0	F
2	66.5	F
1	66.8	F

000000
188:16:42:12

4	79.5	F
3	67.7	F
2	66.2	F
1	66.5	F

000000
188:16:37:12

4 81.1 F
3 80.2 F
2 81.0 F
1 81.2 F

000000
189:10:06:07

4 80.7 F
3 79.8 F
2 80.5 F
1 80.4 F

000000
189:09:27:12

4 80.7 F
3 80.3 F
2 80.1 F
1 80.2 F

000000
189:09:58:06

4 78.2 F
3 79.1 F
2 78.3 F
1 77.5 F

000000
189:10:48:08

4 77.3 F
3 < 59.6 F
2 72.0 F
1 75.7 F

000000
189:09:48:08

4 77.9 F
3 79.7 F
2 78.2 F
1 77.0 F

000000
189:10:36:07

4 81.6 F
3 83.5 F
2 70.5 F
1 71.3 F

000000
188:17:12:12

4 79.5 F
3 65.3 F
2 77.2 F
1 78.8 F

000000
189:09:38:07

4 77.6 F
3 79.7 F
2 78.0 F
1 76.6 F

000000
189:10:26:07

4 80.0 F
3 69.8 F
2 68.3 F
1 68.6 F

000000
188:17:07:12

4 80.6 F
3 79.2 F
2 80.5 F
1 80.4 F

000000
189:09:28:03

4 81.3 F
3 81.0 F
2 81.1 F
1 81.2 F

000000
189:10:16:07

#3

4		73.7	F
3		63.1	F
2		68.1	F
1		71.4	F

000000
189:11:17:31

4		75.9	F
3	<	59.8	F
2		72.0	F
1		74.2	F

000000
189:11:07:31

4		77.8	F
3		68.1	F
2		77.1	F
1		77.1	F

000000
189:10:57:21

4		68.3	F
3	<	60.2	F
2		63.3	F
1		66.3	F

000000
189:11:52:46

4		69.1	F
3	<	59.5	F
2		63.9	F
1		67.1	F

000000
189:11:47:46

4		70.0	F
3	<	58.5	F
2		64.7	F
1		67.9	F

000000
189:11:42:47

4		72.0	F
3	<	59.9	F
2		67.4	F
1		70.1	F

000000
189:11:32:42

4		73.6	F
3		68.2	F
2		69.1	F
1		71.6	F

000000
189:11:22:59

4		65.7	F
3		62.4	F
2		62.8	F
1		64.3	F

000000
189:12:17:46

4		66.2	F
3		61.9	F
2		62.8	F
1		64.6	F

000000
189:12:12:46

4		66.6	F
3		61.6	F
2		62.8	F
1		65.0	F

000000
189:12:07:46

4		67.1	F
3		61.3	F
2		63.0	F
1		65.3	F

000000
189:12:02:46

4		67.7	F
3	<	60.8	F
2		63.0	F
1		65.7	F

000000
189:11:57:46

FIR A TOOL Test Begins

(FIR A TOOL)
EZ8-082787A
Nikon Reading = 3.5
SOAK TIME = 45 min
LOW TEMP. MEAS.

4	64.9	F	4	68.2	F	4	77.0	F
3	63.9	F	3	85.5	F	3	89.4	F
2	63.4	F	2	70.4	F	2	80.8	F
1	63.9	F	1	67.9	F	1	77.5	F
	000000			000000			000000	
	189:12:40:58			189:13:06:03			189:13:31:03	

4	65.0	F	4	66.2	F	4	76.1	F
3	63.6	F	3	78.6	F	3	88.9	F
2	63.3	F	2	66.9	F	2	79.5	F
1	64.0	F	1	65.6	F	1	76.6	F
	000000			000000			000000	
	169:12:37:46			189:13:01:03			189:13:26:03	

4	65.1	F	4	65.3	F	4	74.8	F
3	63.4	F	3	72.0	F	3	88.4	F
2	63.2	F	2	64.9	F	2	78.1	F
1	64.0	F	1	64.5	F	1	75.4	F
	000000			000000			000000	
	189:12:32:46			189:12:56:03			189:13:21:03	

4	65.3	F	4	64.9	F	4	73.0	F
3	63.2	F	3	66.2	F	3	87.8	F
2	63.1	F	2	63.8	F	2	76.7	F
1	64.1	F	1	64.0	F	1	73.6	F
	000000			000000			000000	
	189:12:27:46			189:12:51:03			189:13:16:03	

4	65.5	F	4	64.8	F	4	70.7	F
3	62.8	F	3	64.1	F	3	86.7	F
2	62.9	F	2	63.6	F	2	74.4	F
1	64.2	F	1	64.0	F	1	71.0	F
	000000			000000			000000	
	189:12:22:46			189:12:46:03			189:13:11:03	

4 82.0
3 91.1
2 85.8
1 82.5

000000
189:13:56:03

4 80.9
3 90.9.
2 85.0
1 81.6

000000
189:13:51:03

4 80.0
3 90.7
2 84.0
1 80.6

000000
189:13:46:03

4 78.8
3 90.1
2 83.0
1 79.5

000000
189:13:41:03

4 77.5
3 89.7
2 81.9
1 78.4

000000
189:13:36:03

4 86.9
3 > 95.4
2 89.9
1 87.1

000000
189:14:21:03

4 86.0
3 94.9
2 89.3
1 86.1

000000
189:14:16:03

4 85.0
3 94.5
2 88.2
1 85.1

000000
189:14:11:03

4 83.9
3 91.6
2 87.2
1 84.2

000000
189:14:06:03

4 82.9
3 91.5
2 86.5
1 83.3

000000
189:14:01:03

4 90.3
3 93.5
2 92.1
1 90.3

000000
189:14:46:03

4 89.8
3 93.6
2 92.1
1 89.8

000000
189:14:41:03

4 89.3
3 94.7
2 91.9
1 89.4

000000
189:14:36:03

4 88.6
3 > 95.8
2 91.4
1 88.7

000000
189:14:31:03

4 87.8
3 > 95.5
2 90.7
1 87.9

000000
189:14:26:03

4 91,7 F
3 91,6 F
2 92,0 F
1 91,3 F

000000
189:15:11:03

4 91,6 F
3 92,0 F
2 92,1 F
1 91,2 F

000000
169:15:06:03

4 91,5 F
3 92,8 F
2 92,3 F
1 91,2 F

000000
189:15:01:03

4 91,2 F
3 93,6 F
2 92,3 F
1 90,9 F

000000
189:14:56:03

4 90,8 F
3 93,6 F
2 92,2 F
1 90,6 F

000000
189:14:51:03

4 91,6 F
3 91,3 F
2 91,3 F
1 91,3 F

000000
189:15:35:47

4 91,6 F
3 91,5 F
2 91,4 F
1 91,3 F

000000
189:15:30:47

4 91,7 F
3 91,5 F
2 91,6 F
1 91,4 F

000000
189:15:25:47

4 91,7 F
3 91,4 F
2 91,7 F
1 91,4 F

000000
189:15:20:47

3 91,6 F

000000
189:15:15:43

~~4 91,6 F~~
~~3 91,3 F~~
~~2 91,3 F~~
~~1 91,3 F~~

~~000000~~
~~189:15:45:47~~

END TEST FIR A TOOL

4 91,6 F
3 91,3 F
2 91,3 F
1 91,3 F

000000
189:15:40:47

HIGH TEMP TEST
= 1 sec

EZ8-0C7787A

4 74,9
3 63,6
2 71,2
1 71,1

000000
189:17:16:45

4 76,3
3 65,1
2 73,3
1 73,0

000000
169:17:11:45

4 77,9
3 66,3
2 75,8
1 75,5

000000
169:17:06:45

79,1
3 66,7
2 78,2
1 77,7

000000
189:17:01:45

4 80,1
3 75,5
2 80,3
1 80,1

Sta vis/NIR A tool
000000
189:16:56:40

VIS/NIR A' Tool
Test Starts

4 67,0
3 < 57,9
2 62,7
1 62,7

000000
189:17:41:08

4 68,3
3 < 56,1
2 64,0
1 64,0

000000
189:17:36:08

4 70,0
3 < 57,8
2 65,8
1 65,7

000000
189:17:31:04

4 71,6
3 < 58,6
2 67,7
1 67,6

000000
189:17:26:45

4 73,3
3 62,8
2 69,4
1 69,3

000000
189:17:21:45

4 63,7
3 64,0
2 62,7
1 62,8

000000
189:18:06:08

4 63,8
3 63,6
2 62,1
1 62,5

000000
189:18:01:08

4 64,1
3 63,9
2 61,4
1 61,7

000000
189:17:56:08

4 64,5
3 < 60,5
2 61,0
1 61,2

000000
189:17:51:08

4 65,5
3 < 56,4
2 61,4
1 61,5

000000
189:17:46:08

4	63.9	F
3	63.2	F
2	63.7	F
1	63.6	F

000000
189:18:31:08

4	63.8	F
3	63.3	F
2	63.7	F
1	63.7	F

000000
189:18:26:08

4	63.9	F
3	64.3	F
2	63.6	F
1	63.6	F

000000
189:18:21:08

4	63.7	F
3	64.3	F
2	63.3	F
1	63.4	F

000000
189:18:16:08

4	63.6	F
3	64.0	F
2	63.0	F
1	63.1	F

000000
189:18:11:08

VIS/NIR "A"
HOT TEST
BEGINS

4	63.9	F
3	63.1	F
2	63.7	F
1	63.6	F

000000
189:18:36:08

Nikon Cold T.
Reference measurement
= 10 sec.
EZ8-082800 A TOOL
COLD TEST

4	91.1	F
3	90.3	F
2	91.1	F
1	91.0	F

000000
189:20:11:43

4		89.1	F
3	>	95.6	F
2		92.2	F
1		92.0	F

000000
189:19:41:43

4	79.4	F
3	93.9	F
2	84.8	F
1	84.8	F

000000
189:19:11:43

4	64.4	F
3	71.2	F
2	64.4	F
1	64.6	F

000000
189:18:40:39

4	64.3	F
3	69.2	F
2	64.1	F
1	64.2	F

000000
189:18:39:41

4 89.9 F
3 89.7 F
2 89.7 F
1 89.7 F

000000
189:22:41:43

4 89.8 F
3 89.7 F
2 89.6 F
1 89.6 F

000000
190:01:11:43

4 89.8 F
3 89.9 F
2 89.5 F
1 89.6 F

000000
190:03:41:43

4 89.9 F
3 89.7 F
2 89.7 F
1 89.7 F

000000
189:22:11:44

4 89.9 F
3 89.7 F
2 89.6 F
1 89.6 F

000000
190:00:41:44

4 89.9 F
3 89.8 F
2 89.7 F
1 89.7 F

000000
190:03:11:44

4 90.1 F
3 89.9 F
2 89.8 F
1 89.8 F

000000
189:21:41:44

4 89.8 F
3 89.7 F
2 89.6 F
1 89.6 F

000000
190:00:11:43

4 89.9 F
3 89.9 F
2 89.7 F
1 89.7 F

000000
190:02:41:43

4 90.3 F
3 90.1 F
2 89.9 F
1 89.9 F

000000
189:21:11:44

4 89.9 F
3 89.9 F
2 89.7 F
1 89.7 F

000000
189:23:41:44

4 89.9 F
3 89.7 F
2 89.6 F
1 89.7 F

000000
190:02:11:44

4 90.6 F
3 89.9 F
2 90.1 F
1 90.2 F

000000
189:20:41:44

4 89.8 F
3 89.8 F
2 89.6 F
1 89.6 F

000000
189:23:11:43

4 89.8 F
3 89.8 F
2 89.6 F
1 89.7 F

000000
190:01:41:43

4 89.7 °F
3 89.5 °F
2 89.4 °F
1 89.5 °F

000000
190:06:11:44

4 89.8 °F
3 89.7 °F
2 89.5 °F
1 89.6 °F

000000
190:05:41:43

4 89.8 °F
3 89.6 °F
2 89.5 °F
1 89.5 °F

000000
190:05:11:43

4 89.7 °F
3 89.7 °F
2 89.5 °F
1 89.5 °F

000000
190:04:41:44

4 89.9 °F
3 89.8 °F
2 89.6 °F
1 89.7 °F

000000
190:04:11:43

4 89.7 °F
3 89.7 °F
2 89.5 °F
1 89.5 °F

000000
190:09:11:43

4 89.6 °F
3 89.8 °F
2 89.5 °F
1 89.5 °F

000000
190:08:41:43

4 89.7 °F
3 89.6 °F
2 89.4 °F
1 89.5 °F

000000
190:08:11:43

4 89.6 °F
3 89.5 °F
2 89.4 °F
1 89.4 °F

000000
190:07:41:43

4 89.7 °F
3 89.6 °F
2 89.4 °F
1 89.5 °F

000000
190:07:11:44

4 89.7 °F
3 89.7 °F
2 89.5 °F
1 89.5 °F

000000
190:06:41:43

4 89.8 °F
3 90.1 °F
2 89.6 °F
1 89.7 °F

000000
190:09:44:46

END HIGH TEMP. TEST OF VIS/NIR "A" TOOL
(EZ8-082800A TOOL)

HIGH T. MEASUREMENT
TIME: 0942
TEMP: 89.8 °F
NIKON MEAS.: 13 SEC

1 89.4 °F

000000
190:09:39:44

TEST FINISHED

10 60,1 *

000000
226:12:34:20

10 60,7 *

000000
226:12:29:20

10 60,8 *

000000
226:12:24:20

10 61,2 *

000000
226:12:19:20

10 62,2 *

000000
226:12:14:20

10 67,3 *

000000
226:12:09:20

10 69,2 *

000000
226:12:08:37

10 69,7 *

000000
226:12:08:26

Channel 10 attached to TOOL EZ-2798C for ~~the~~ TEMP. CHARACTERISATION TEST

HIGH TEMP. TEST FOR 2798C TOOL WITH HEATER ON

10 59,2 *

000000
226:13:19:20

10 59,2 *

000000
226:13:14:20

10 59,3 *

000000
226:13:09:20

10 59,3 *

000000
226:13:04:20

10 59,6 *

000000
226:12:59:20

10 59,2 *

000000
226:12:54:20

10 59,3 *

000000
226:12:49:20

10 59,3 *

000000
226:12:44:20

10 59,5 *

000000
226:12:39:20

10 101,5 *

000000
226:14:24:42

10 103,4 *

000000
226:14:23:42

10 105,2 *

000000
226:14:22:42

10 107,3 *

000000
226:14:21:42

10 109,5 *

000000
226:14:20:42

10 112,1 *

000000
226:14:19:42

10 114,7 *

000000
226:14:18:42

10 117,7 *

000000
226:14:17:42

HEATER TURNED OFF TOOL LEFT TO COOL NATURALLY

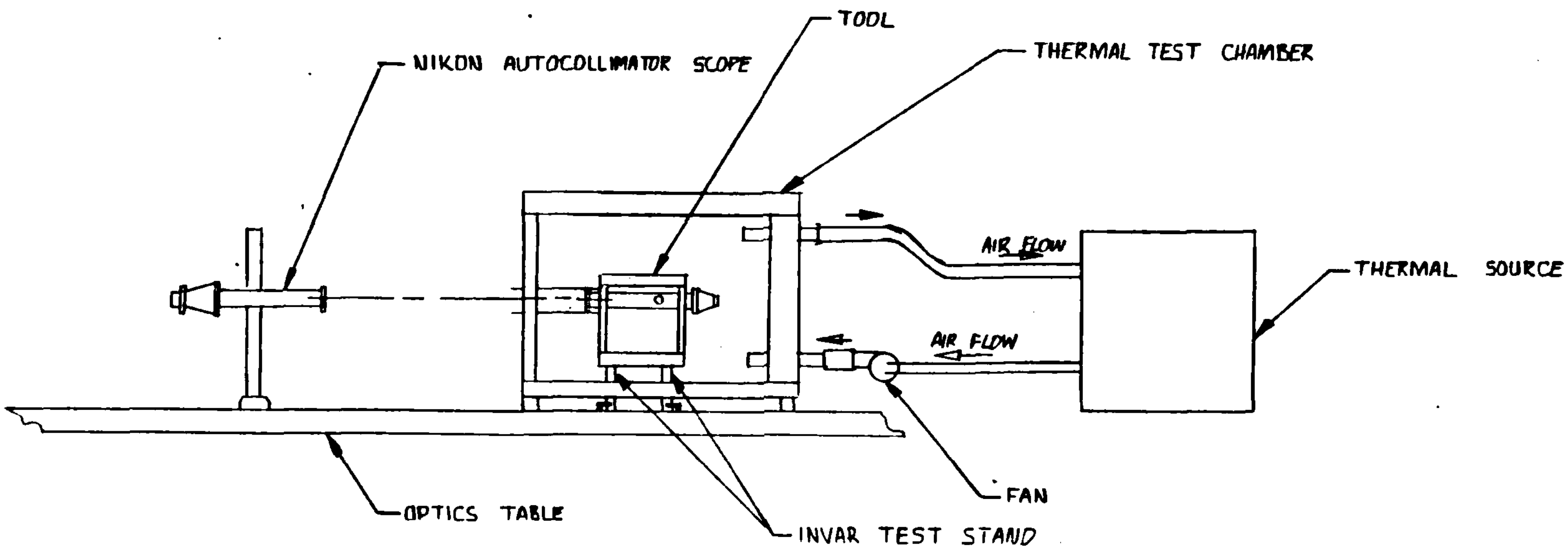
10 117,6 *

000000
226:14:16:19

10 114,7 *

000000
226:14:11:19

TEST SET-UP FOR TEMPERATURE CHARACTERIZATION OF TOOLS



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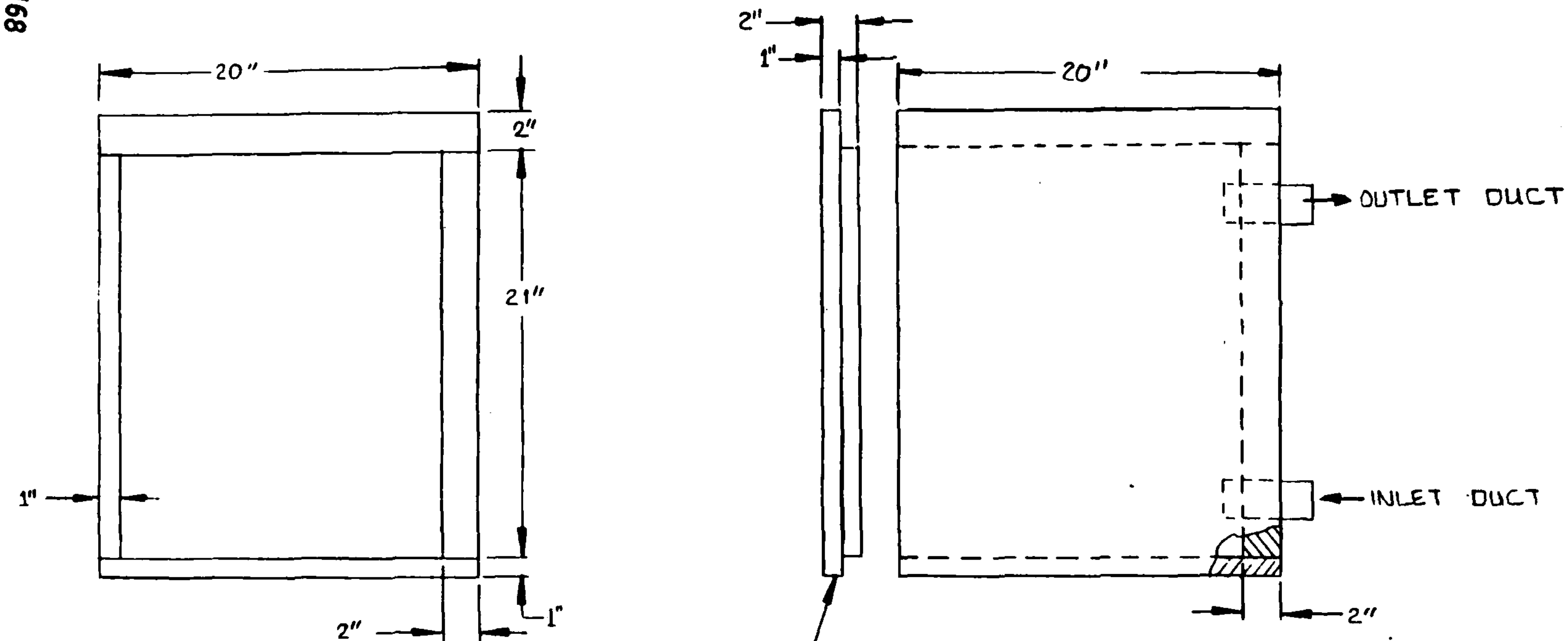
THERMAL CHAMBER FOR TEMPERATURE CHARACTERIZATION OF TOOLS

MATERIAL: CLOSED CELL STYROFOAM
DRAWING SCALE: 1/6



FRONT VIEW

SIDE VIEW

APPENDIX A-4

COMPUTER ALGORITHMS

VIS/NIR Focus Algorithm

```
        BEGIN ATLAS PROGRAM 'LINWID2'$

C     THIS PROGRAM CALCULATES THE RELATIVE WIDTH OF A WHITE VERTICAL LINE
      WHICH WILL BE COMPARED TO THE SAME MEASUREMENT MADE AT ANOTHER TEMP.
      WITH THIS ALGORYTHM, RELATIVE FOCUS CHANGES CAN BE OBSERVED.$

        DECLARE DECIMAL, 'AUG','AUGSTAT','SECAD','SECADSP','SECDVC',
                         'ERESTART','DEVCLR','BZYBITS','AUG_WRITE',
                         'AUG_INPUT','AUG_DVC','ERR'$

        DECLARE DECIMAL, 'I','J','A','B','S','X','Y','LINWID','CHEK',
                         'SUM','AVG','VLT'$

        DECLARE DECIMAL,LIST, 'Z'(100)$

        DEFINE PROCEDURE, 'NOCROSS'$
        DISPLAY"!C!L
                         NO CROSSING WAS FOUND.
                EITHER THE LIGHT INTENSITY MUST BE INCREASED
                    OR THRESHOLD VALUE MUST BE INCREASED."$

        'C'='C'+1$
        END 'NOCROSS'$

        DEFINE PROCEDURE, 'ERRNUM'$
        INPUT IO485 'AUG_INPUT','ERR'$
        RECORD 'ERR',"ERROR NUMBER = #"$
        GOTO STEP 999999$
        END 'ERRNUM'$

E     100 GOTO STEP 110$
E     105 PERFORM 'ERRNUM'$
      110 'AUG'=6$
        'AUGSTAT'=45*1024$
        'SECAD'=16*32$
        'SECADSP'=3*32$
        'SECDVC'=24*32$
        'ERESTART'=4194304*1$
        'DEVCLR'=16777216*1$
        'BZYBITS'=9*67108864$
        'AUG_WRITE'='AUG'+'SECADSP'+'AUGSTAT'+'BZYBITS'+'ERESTART'$
        'AUG_INPUT'='AUG'+'SECAD'$
        'AUG_DVC'='AUG'+'SECDVC'+'DEVCLR'$

        WRITE IO488 'AUG_WRITE',"UCSHUT,POS=1"$

        DISPLAY"!C!L
        DOES THE A-MIRROR NEED TO BE MOVED?
        <-1>=YES        <+1>=NO"$

        INPUT 'I'$

        COMPARE 'I',GT 0$
           GOTO STEP 120 IF GO$

        WRITE IO488 'AUG_WRITE',"LCAN1,POS=2"$

      120 DISPLAY"!C!L
        DOES THE B-MIRROR NEED TO BE MOVED?
        <-1>=YES        <+1>=NO"$

        INPUT 'I'$
```

```
     COMPARE 'I',GT 0$
        GOTO STEP 150 IF GO$

     WRITE IO488 'AUX_WRITE',"OCUM1,POS=2"$

150 DISPLAY"!C!L
       1              2              3             4             5            6
   OGLAMP       OGFILTER     OGMIRROR  OGDIFF/FILTER  OCFOCUS   OCSHUTTER

     1=ON        1=EO MUX       1=IN         1=IN          1=SET       1=OPEN
     2=OFF       2=TV SEN       2=OUT        2=OUT                     2=CLOSED"$

     DISPLAY"!L
      INPUT THE APPROPRIATE 2-DIGIT NUMBER TO PERFORM THE DESIRED
         OPERATION.  THE FIRST DIGIT SELECTS THE DEVICE.  THE
                SECOND DIGIT DESIGNATES THE FUNCTION.

              ENTER A <99> TO CONTINUE WITH THE PROGRAM.
                 ENTER A <100> TO EXIT THE PROGRAM."$

     INPUT 'A'$

     COMPARE 'A',EQ 11$
        GOTO STEP 200 IF GO$

     COMPARE 'A',EQ 12$
        GOTO STEP 210 IF GO$

     COMPARE 'A',EQ 21$
        GOTO STEP 220 IF GO$

     COMPARE 'A',EQ 22$
        GOTO STEP 230 IF GO$

     COMPARE 'A',EQ 31$
        GOTO STEP 240 IF GO$

     COMPARE 'A',EQ 32$
        GOTO STEP 250 IF GO$

     COMPARE 'A',EQ 41$
        GOTO STEP 260 IF GO$

     COMPARE 'A',EQ 42$
        GOTO STEP 270 IF GO$

     COMPARE 'A',EQ 51$
        GOTO STEP 280 IF GO$

     COMPARE 'A',EQ 61$
        GOTO STEP 290 IF GO$

     COMPARE 'A',EQ 62$
        GOTO STEP 295 IF GO$

     COMPARE 'A',EQ 99$
        GOTO STEP 297 IF GO$

     COMPARE 'A',EQ 100$
        GOTO STEP 999999 IF GO$

        GOTO STEP 150$
```

```
200 WRITE IO488 'AUG_WRITE',"UGLAMP,ON"$

    APPLY DC-SIGNAL DC28, VOLTAGE 0.0V$
    FOR 'VLT' = .55 THRU 11.0 BY .55 THEN$
       SETUP DC-SIGNAL DC28, VOLTAGE 'VLT' V$
       DELAY .5 SEC$
    END FOR$
       GOTO STEP 150$

210 WRITE IO488 'AUG_WRITE',"UGLAMP,OFF"$
    APPLY DC-SIGNAL DC28, VOLTAGE 0.0V$
       GOTO STEP 150$

220 WRITE IO488 'AUG_WRITE',"UGFIL,POS=1"$
       GOTO STEP 150$

230 WRITE IO488 'AUG_WRITE',"UGFIL,POS=2"$
       GOTO STEP 150$

240 WRITE IO488 'AUG_WRITE',"UGMIRR,POS=1"$
       GOTO STEP 150$

250 WRITE IO488 'AUG_WRITE',"UGMIRR,POS=2"$
       GOTO STEP 150$

260 WRITE IO488 'AUG_WRITE',"UGDIFF,POS=1"$
       GOTO STEP 150$

270 WRITE IO488 'AUG_WRITE',"UGDIFF,POS=2"$
       GOTO STEP 150$

280 DISPLAY"!C!L INPUT THE NUMBER OF STEPS (0 THRU +/- 16000)"$
    INPUT 'S'$
    WRITE IO488 'AUG_WRITE','S',"DCFOCUS,STEPS=#"$
       GOTO STEP 150$

290 WRITE IO488 'AUG_WRITE',"DCSHUT,POS=1"$
       GOTO STEP 150$

295 WRITE IO488 'AUG_WRITE',"DCSHUT,POS=2"$

       GOTO STEP 150$

297 DISPLAY"!C!L
              PIXELS 20-119 WILL BE READ BY THE CAMERA
            WHICH COVERS THE CENTER PORTION OF THE SCREEN.
         THE CENTER LINE WILL BE READ.  INPUT THE NUMBER OF
              TIMES YOU WISH TO HAVE THE LINE READ.
          AN AVERAGE WILL BE CALCULATED TO MINIMIZE ERROR."$

    INPUT 'I'$
    'D'='I'$
    'SUM'=0$

    WRITE IO488 'AUG_WRITE',"CALC,RESET,MAT=4,1,100,REAL,0,MAT=4,FILL"$

    FOR 'J' = 1 THRU 'I' THEN$

    WRITE IO488 'AUG_WRITE',"CALC,MAT=3,1,100,BYTE,MAT=2,1,100,INTEGER,",
    "MAT=1,1,100,REAL,0,MAT=3,FILL,0,MAT=2,FILL,0,MAT=1,FILL"$

    WRITE IO488 'AUG_WRITE',"DCCAM,MAT=3,STRTLN=120,STOPLN=120,",
```

```
        "STRTPX=20,STOPPX=119"$

        WRITE I0466 'AUG_WRITE',"CALC,MAT=3,MAT=2,MOVE,MAT=2,MAT=1,MOVE,",
        "MAT=1,1,200,-CROSS,CPTR,OUT"$
        INPUT I0468 'AUG_INPUT','CHEK'$

        COMPARE 'CHEK',EQ 0$
           GOTO STEP 600 IF GO$

C     GET LINEWIDTH MEASUREMENT EACH TIME THROUGH LOOP SO AN AVERAGE CAN BE MADE$
        WRITE I0466 'AUG_WRITE',"CALC,MAT=1,1,235,-CROSS,CPTR,OUT"$
        INPUT I0468 'AUG_INPUT','X'$

        COMPARE 'X',EQ 0$
           GOTO STEP 300 IF NOGO$

        PERFORM 'NOCROSS'$
           GOTO STEP 600$

    300 WRITE I0466 'AUG_WRITE',"CALC,MAT=1,1,235,-RCROSS,CPTR,OUT"$
        INPUT I0468 'AUG_INPUT','Y'$

        COMPARE 'Y',EQ 0$
           GOTO STEP 500 IF NOGO$

        PERFORM 'NOCROSS'$
           GOTO STEP 600$

    500 'LINWID'='Y'-'X'$

        RECORD""$
        RECORD 'LINWID',"LINE WIDTH = ##.##"$

        'SUM'='LINWID'+'SUM'$

           GOTO STEP 700$

C      'B' IS THE NUMBER OF GOOD DATA SAMPLES OBTAINED. (USED TO CALC. AVERAGE.$
    600 'B'='B'-1$

    700 END FOR$

        'AVG'='SUM'/'B'$

        RECORD""$
        RECORD 'AVG',"THIS GIVES AN AVERAGE RELATIVE LINE WIDTH OF #.##"$
        RECORD 'B',"## GOOD DATA SAMPLES WERE TAKEN."$

        DISPLAY"!C!L
                                    HIT <PROCEED> TO CONTINUE."$

        WAIT-FOR MANUAL-INTERVENTION$

           GOTO STEP 150$

 999999 TERMINATE$
```

VIS/NIR Boresight Algorithm

```
BEGIN ATLAS PROGRAM 'XBOR'$

C     THIS PROGRAM LOCATES THE COORDINATES OF A CROSSHAIRS INTERSECTION THUS
      PERFORMING A BORESIGHT TEST FOR THE TEMPERATURE TESTS.$

      DECLARE DECIMAL, 'AUG','AUGSTAT','SECAD','SECADSP','SECDVC',
                       'ERESTART','DEVCLR','BZYBITS','AUG_WRITE','J','H',
                       'AUG_INPUT','AUG_DVC','ERR'$

      DECLARE DECIMAL, 'MAT2X','MAT3X','MAT4X','MAT5X','MAT2Y','MAT3Y',
                       'MAT4Y','MAT5Y','I','B1','B2','M1','M2','MAT2Y1',
                       'YCROSS','XCROSS','MAT2Y2','MAT3X1','MAT3X2',
                       'MAT4Y1','MAT4Y2','MAT5X1','MAT5X2'$

      DECLARE DECIMAL,LIST, 'X'(100)$

      DEFINE PROCEDURE, 'MIRRORS'$
      DISPLAY"!C!L
      ENTER A <+1> TO MOVE THE A MIRROR.
      ENTER A <-1> TO MOVE THE B MIRROR."$

      INPUT 'I'$

      COMPARE 'I',GT 0$
         GOTO STEP 20 IF GO$

      WRITE I0488 'AUG_WRITE',"DCBM1,POS=2"$
         GOTO STEP 30$

   20 WRITE I0488 'AUG_WRITE',"DCAM1,POS=2"$

   30 END 'MIRRORS'$

      DEFINE PROCEDURE, 'NOCROSS'$
      DISPLAY"
                       THIS IS AN ERROR CAUSED BY ONE OF TWO PROBLEMS.
                       EITHER THE CROSS HAIRS DO NOT INTERSECT IN THE
                       AREA CONTAINED BY THE 100 X 80 MATRIX OR THE
                       LIGHT INTENSITY IS TOO LOW."$
      GOTO STEP 999999$
      END 'NOCROSS'$

      DEFINE PROCEDURE, 'BOOUT'$
      INPUT I0488 'AUG_INPUT','X'(1),'X'(2),'X'(3),'X'(4),'X'(5),'X'(6),
      'X'(7),'X'(8),'X'(9),'X'(10),'X'(11),'X'(12),'X'(13),'X'(14),
      'X'(15),'X'(16),'X'(17),'X'(18),'X'(19),'X'(20),'X'(21),
      'X'(22),'X'(23),'X'(24),'X'(25),'X'(26),'X'(27),'X'(28),
      'X'(29),'X'(30),'X'(31),'X'(32),'X'(33),'X'(34),'X'(35),
      'X'(36),'X'(37),'X'(38),'X'(39),'X'(40),'X'(41),'X'(42),
      'X'(43),'X'(44),'X'(45),'X'(46),'X'(47),'X'(48),'X'(49),
      'X'(50),'X'(51),'X'(52),'X'(53),'X'(54),'X'(55),'X'(56),
      'X'(57),'X'(58),'X'(59),'X'(60),'X'(61),'X'(62),'X'(63),
      'X'(64),'X'(65),'X'(66),'X'(67),'X'(68),'X'(69),'X'(70),
      'X'(71),'X'(72),'X'(73),'X'(74),'X'(75),'X'(76),'X'(77),
      'X'(78),'X'(79),'X'(80)$

      RECORD""$
      RECORD
      'X'(1)," ###",'X'(2)," ###",'X'(3)," ###",'X'(4)," ###",'X'(5)," ###",
      'X'(6)," ###",'X'(7)," ###",'X'(8)," ###",'X'(9)," ###",'X'(10)," ###",
      'X'(11)," ###",'X'(12)," ###",'X'(13)," ###",'X'(14)," ###",
      'X'(15)," ###"$
```

```
RECORD
'X'(16)," ###",'X'(17)," ###",'X'(18)," ###",'X'(19)," ###",
'X'(20)," ###",'X'(21)," ###",'X'(22)," ###",'X'(23)," ###",
'X'(24)," ###",'X'(25)," ###",'X'(26)," ###",'X'(27)," ###",
'X'(28)," ###",'X'(29)," ###",'X'(30)," ###"$
RECORD
'X'(31)," ###",'X'(32)," ###",'X'(33)," ###",'X'(34)," ###",
'X'(35)," ###",'X'(36)," ###",'X'(37)," ###",'X'(38)," ###",
'X'(39)," ###",'X'(40)," ###",'X'(41)," ###",'X'(42)," ###",
'X'(43)," ###",'X'(44)," ###",'X'(45)," ###"$
RECORD
'X'(46)," ###",'X'(47)," ###",'X'(48)," ###",'X'(49)," ###",
'X'(50)," ###",'X'(51)," ###",'X'(52)," ###",'X'(53)," ###",
'X'(54)," ###",'X'(55)," ###",'X'(56)," ###",'X'(57)," ###",
'X'(58)," ###",'X'(59)," ###",'X'(60)," ###"$
RECORD
'X'(61)," ###",'X'(62)," ###",'X'(63)," ###",'X'(64)," ###",
'X'(65)," ###",'X'(66)," ###",'X'(67)," ###",'X'(68)," ###",
'X'(69)," ###",'X'(70)," ###",'X'(71)," ###",'X'(72)," ###",
'X'(73)," ###",'X'(74)," ###",'X'(75)," ###"$
RECORD
'X'(76)," ###",'X'(77)," ###",'X'(78)," ###",'X'(79)," ###",
'X'(80)," ###"$
END '80OUT'$

DEFINE PROCEDURE, '100OUT'$
INPUT 1048P 'AUG_INPUT','X'(1),'X'(2),'X'(3),'X'(4),'X'(5),'X'(6),
'X'(7),'X'(8),'X'(9),'X'(10),'X'(11),'X'(12),'X'(13),'X'(14),
'X'(15),'X'(16),'X'(17),'X'(18),'X'(19),'X'(20),'X'(21),
'X'(22),'X'(23),'X'(24),'X'(25),'X'(26),'X'(27),'X'(28),
'X'(29),'X'(30),'X'(31),'X'(32),'X'(33),'X'(34),'X'(35),
'X'(36),'X'(37),'X'(38),'X'(39),'X'(40),'X'(41),'X'(42),
'X'(43),'X'(44),'X'(45),'X'(46),'X'(47),'X'(48),'X'(49),
'X'(50),'X'(51),'X'(52),'X'(53),'X'(54),'X'(55),'X'(56),
'X'(57),'X'(58),'X'(59),'X'(60),'X'(61),'X'(62),'X'(63),
'X'(64),'X'(65),'X'(66),'X'(67),'X'(68),'X'(69),'X'(70),
'X'(71),'X'(72),'X'(73),'X'(74),'X'(75),'X'(76),'X'(77),
'X'(78),'X'(79),'X'(80),'X'(81),'X'(82),'X'(83),'X'(84),
'X'(85),'X'(86),'X'(87),'X'(88),'X'(89),'X'(90),'X'(91),
'X'(92),'X'(93),'X'(94),'X'(95),'X'(96),'X'(97),'X'(98),
'X'(99),'X'(100)$

RECORD""$
RECORD
'X'(1)," ###",'X'(2)," ###",'X'(3)," ###",'X'(4)," ###",'X'(5)," ###",
'X'(6)," ###",'X'(7)," ###",'X'(8)," ###",'X'(9)," ###",'X'(10)," ###",
'X'(11)," ###",'X'(12)," ###",'X'(13)," ###",'X'(14)," ###",
'X'(15)," ###"$
RECORD
'X'(16)," ###",'X'(17)," ###",'X'(18)," ###",'X'(19)," ###",
'X'(20)," ###",'X'(21)," ###",'X'(22)," ###",'X'(23)," ###",
'X'(24)," ###",'X'(25)," ###",'X'(26)," ###",'X'(27)," ###",
'X'(28)," ###",'X'(29)," ###",'X'(30)," ###"$
RECORD
'X'(31)," ###",'X'(32)," ###",'X'(33)," ###",'X'(34)," ###",
'X'(35)," ###",'X'(36)," ###",'X'(37)," ###",'X'(38)," ###",
'X'(39)," ###",'X'(40)," ###",'X'(41)," ###",'X'(42)," ###",
'X'(43)," ###",'X'(44)," ###",'X'(45)," ###"$
RECORD
'X'(46)," ###",'X'(47)," ###",'X'(48)," ###",'X'(49)," ###",
'X'(50)," ###",'X'(51)," ###",'X'(52)," ###",'X'(53)," ###",
'X'(54)," ###",'X'(55)," ###",'X'(56)," ###",'X'(57)," ###",
'X'(58)," ###",'X'(59)," ###",'X'(60)," ###"$
```

```
      RECORD
      'X'(61)," ###",'X'(62)," ###",'X'(63)," ###",'X'(64)," ###",
      'X'(65)," ###",'X'(66)," ###",'X'(67)," ###",'X'(68)," ###",
      'X'(69)," ###",'X'(70)," ###",'X'(71)," ###",'X'(72)," ###",
      'X'(73)," ###",'X'(74)," ###",'X'(75)," ###"$
      RECORD
      'X'(76)," ###",'X'(77)," ###",'X'(78)," ###",'X'(79)," ###",
      'X'(80)," ###",'X'(81)," ###",'X'(82)," ###",'X'(83)," ###",
      'X'(84)," ###",'X'(85)," ###",'X'(86)," ###",'X'(87)," ###",
      'X'(88)," ###",'X'(89)," ###",'X'(90)," ###"$
      RECORD
      'X'(91)," ###",'X'(92)," ###",'X'(93)," ###",'X'(94)," ###",
      'X'(95)," ###",'X'(96)," ###",'X'(97)," ###",'X'(98)," ###",
      'X'(99)," ###",'X'(100)," ###"$
      END '100OUT'$

      DEFINE PROCEDURE, 'ERRNUM'$
      INPUT 10488 'AUG_INPUT','ERR'$
      RECORD 'ERR',"ERROR NUMBER = #"$
      GOTO STEP 999999$
      END 'ERRNUM'$

E   100 GOTO STEP 110$
E   105 PERFORM 'ERRNUM'$
    110 'AUG'=6$
      'AUGSTAT'=45*1024$
      'SECAD'=16*32$
      'SECADSP'=6*32$
      'SECDVC'=24*32$
      'ERESTART'=4194304*1$
      'DEVCLR'=16777216*1$
      'BZYBITS'=9*67108864$
      'AUG_WRITE'='AUG'+'SECADSP'+'AUGSTAT'+'BZYBITS'+'ERESTART'$
      'AUG_INPUT'='AUG'+'SECAD'$
      'AUG_DVC'='AUG'+'SECDVC'+'DEVCLR'$

C    OPEN THE DAY COLIMATOR SHUTTER.$
      WRITE 10488 'AUG_WRITE',"DCSHUT,POS=1"$

    120 DISPLAY"!C
              MAKE ALL ADJUSTMENTS TO THE TARGET SOURCE
                          AT THIS TIME.
                    IF THE TARGET CANNOT BE SEEN,
                          ENTER A -1.
                       IF EVERYTHING IS O.K.
                          ENTER A +1."$
      INPUT 'I'$
      COMPARE 'I',GT 0$
         GOTO STEP 150 IF GO$

      PERFORM 'MIRRORS'$
         GOTO STEP 120$

    150 WRITE 10488 'AUG_WRITE',"CALC,RESET,MAT=3,100,80,BYTE,MAT=2,100,",
      "80,INTEGER,MAT=1,100,80,REAL,0,MAT=1,FILL,0,MAT=2,FILL,0,MAT=3,FILL"$

C    TAKE A PICTURE OF THE BK IN THE MIDDLE OF THE SCREEN.$
      WRITE 10488 'AUG_WRITE',"DCCAM,MAT=3,STRTLN=90,STOPLN=189,STRTPX=18,",
      "STOPPX=97"$

      WRITE 10488 'AUG_WRITE',"CALC,MAT=3,MAT=2,MOVE,MAT=2,MAT=1,MOVE,",
      "MAT=3,MAT=2,RELEASE"$
```

```
C     DEFINE DAUGHTER MATRICES AS VECTORS NEAR THE EDGES OF THE 8K SQUARE.$
        WRITE 10488 'AUG_WRITE',"CALC,MAT=2,100,1,MAT=1,1,2,EQUIV,MAT=4,",
        "100,1,MAT=1,1,78,EQUIV,MAT=3,1,80,MAT=1,2,1,EQUIV,MAT=5,1,80,",
        "MAT=1,98,1,EQUIV"$

        RECORD""$
        RECORD"LEFT COLUMN VECTOR"$
        WRITE 10488 'AUG_WRITE',"CALC,MAT=2,OUT"$
        PERFORM '100OUT'$

        RECORD""$
        RECORD"RIGHT COLUMN VECTOR"$
        WRITE 10488 'AUG_WRITE',"CALC,MAT=4,OUT"$
        PERFORM '100OUT'$

        RECORD""$
        RECORD"UPPER ROW VECTOR"$
        WRITE 10488 'AUG_WRITE',"CALC,MAT=3,OUT"$
        PERFORM '80OUT'$

        RECORD""$
        RECORD"LOWER ROW VECTOR"$
        WRITE 10488 'AUG_WRITE',"CALC,MAT=5,OUT"$
        PERFORM '80OUT'$

        DISPLAY"!C
                              THE LEFT COLUMN VECTOR IS BEING
                              SEARCHED FOR A PLUS CROSSING."$
        DISPLAY"!L"$
        WRITE 10488 'AUG_WRITE',"CALC,MAT=2,1,180,+CROSS,RPTR,OUT"$
        INPUT 10488 'AUG_INPUT','MAT2Y1'$
        WRITE 10488 'AUG_WRITE',"CALC,MAT=2,1,180,-CROSS,RPTR,OUT"$
        INPUT 10488 'AUG_INPUT','MAT2Y2'$

        RECORD 'MAT2Y1',"CROSS1= #.#",'MAT2Y2'," CROSS2= #.#"$

        'MAT2Y'=('MAT2Y2'-'MAT2Y1')/2$

        RECORD 'MAT2Y',"DIFFERENCE= #.#"$

        'MAT2Y'='MAT2Y'+'MAT2Y1'$
        'MAT2X'=2$
        'MAT2Y'=100-'MAT2Y'$
        RECORD 'MAT2Y',"THE LEFT COLUMN VECTOR CROSSED THE TARGET LINE AT #.#"$
        COMPARE 'MAT2Y',EQ 100$
           GOTO STEP 300 IF NOGO$
        PERFORM 'NOCROSS'$

    300 DISPLAY "
                              THE RIGHT COLUMN VECTOR IS BEING
                              SEARCHED FOR A PLUS CROSSING."$
        DISPLAY"!L"$
        WRITE 10488 'AUG_WRITE',"CALC,MAT=4,1,180,+CROSS,RPTR,OUT"$
        INPUT 10488 'AUG_INPUT','MAT4Y1'$
        WRITE 10488 'AUG_WRITE',"CALC,MAT=4,1,180,-CROSS,RPTR,OUT"$
        INPUT 10488 'AUG_INPUT','MAT4Y2'$

        RECORD 'MAT4Y1',"CROSS1= #.#",'MAT4Y2'," CROSS2= #.#"$

        'MAT4Y'=('MAT4Y2'-'MAT4Y1')/2$

        RECORD 'MAT4Y',"DIFFERENCE= #.#"$
```

```
        'MAT4Y'='MAT4Y'+'MAT4Y1'$
        'MAT4X'=79$
        'MAT4Y'=100-'MAT4Y'$
        RECORD'MAT4Y',"THE RIGHT COLUMN VECTOR CROSSED THE TARGET LINE AT #.#"$
        COMPARE 'MAT4Y',EQ 100$
           GOTO STEP 500 IF NOGO$
        PERFORM 'NOCROSS'$

    500 DISPLAY"
                                THE UPPER ROW VECTOR IS BEING
                                SEARCHED FOR A PLUS CROSSING."$
        DISPLAY"!L"$
        WRITE 10488 'AUG_WRITE',"CALC,MAT=3,1,180,+CROSS,CPTR,OUT"$
        INPUT 10488 'AUG_INPUT','MAT3X1'$
        WRITE 10488 'AUG_WRITE',"CALC,MAT=3,1,180,-CROSS,CPTR,OUT"$
        INPUT 10488 'AUG_INPUT','MAT3X2'$

        RECORD 'MAT3X1',"CROSS1= #.#",'MAT3X2'," CROSS2= #.#"$

        'MAT3X'=('MAT3X2'-'MAT3X1')/2$

        RECORD 'MAT3X',"DIFFERENCE= #.#"$

        'MAT3X'='MAT3X'+'MAT3X1'$
        'MAT3Y'=98$
        RECORD 'MAT3X',"THE UPPER ROW VECTOR CROSSED THE TARGET LINE AT ##.#"$
        COMPARE 'MAT3X',EQ 0$
           GOTO STEP 700 IF NOGO$
        PERFORM 'NOCROSS'$

    700 DISPLAY "
                                THE LOWER ROW VECTOR IS BEING
                                SEARCHED FOR A PLUS CROSSING."$
        DISPLAY"!L"$
        WRITE 10488 'AUG_WRITE',"CALC,MAT=5,1,180,+CROSS,CPTR,OUT"$
        INPUT 10488 'AUG_INPUT','MAT5X1'$
        WRITE 10488 'AUG_WRITE',"CALC,MAT=5,1,180,-CROSS,CPTR,OUT"$
        INPUT 10488 'AUG_INPUT','MAT5X2'$

        RECORD 'MAT5X1',"CROSS1= #.#",'MAT5X2'," CROSS2= #.#"$

        'MAT5X'=('MAT5X2'-'MAT5X1')/2$

        RECORD 'MAT5X',"DIFFERENCE= #.#"$

        'MAT5X'='MAT5X'+'MAT5X1'$

        RECORD 'MAT5X',"CENTER IS AT #.#"$

        'MAT5Y'=2$
        RECORD 'MAT5X',"THE LOWER ROW VECTOR CROSSED THE TARGET LINE AT ##.#"$
        COMPARE 'MAT5X',EQ 0$
           GOTO STEP 900 IF NOGO$
        PERFORM 'NOCROSS'$

C       THE LOCATION OF THE INTERSECTION OF THE CROSSHAIRS IS FOUND
        BY SOLVING THE STANDARD EQUATION Y = M*X + B.$

C       M1 AND M2 ARE THE SLOPES OF THE TWO LINES.$
    900 'M1'=(('MAT2Y'-'MAT4Y')/('MAT2X'-'MAT4X'))$
        'M2'=(('MAT5Y'-'MAT3Y')/('MAT5X'-'MAT3X'))$

        DISPLAY"!L"$
```

```
        RECORD 'M1',"THE HORIZONTAL CROSSHAIR HAS A SLOPE OF ###.#"$
        RECORD 'M2',"THE VERTICAL CROSSHAIR HAS A SLOPE OF ###.#"$

C     B1 AND B2 ARE THE LOCATIONS OF THE Y AXIS INTERSECTIONS.$
        'B1'='MA14Y'-'M1'*'MA14X'$
        'B2'='MA13Y'-'M2'*'MA13X'$

        'XCROSS'=('B1'-'B2')/('M2'-'M1')$

C     PLUG THE X CROSSING INTO ORIGINAL FORMULA TO FIND THE Y CROSSING.$
        'YCROSS'='M1'*'XCROSS'+'B1'$

        DISPLAY"!L"$
        RECORD 'XCROSS',"THE CROSSHAIRS INTERSECT AT ##.#",'YCROSS'," ##.#"$

          GOTO STEP 1505

 999999 TERMINATE$
```

APPENDIX A-5

E/O AUGMENTATION TEMPERATURE CHAMBER THERMAL ANALYSIS

MARTIN MARIETTA

INTRACOMPANY MEMORANDUM

SYS ICM L83-1379
DATE 27 June 1983

TO: Mr. A. Papke

CC: Messrs. M. Brown, J. Johnston, D. McCrary, T. Randich, and R. Straiton

FROM: Mr. Paul Kendall DEPT. 54DE MP. 234 EXT. 3716

SUBJECT: Thermal Requirements for Temperature Chamber for Testing the TADS/PNVS PGSE Augmentation Equipment

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REFERENCE: (A) DAAK50-82-G-0002, D.O. 0003, Environmental Temperature Test on Electro Optical Augmentation Assembly, May 2, 1983

Reference (A) requires that the subject equipment be tested at environmental temperatures of 65°F and 90°F. The size and weight of the equipment and other peculiarities of the equipment are such that it is not practical to use an existing environmental chamber. The alternative is to construct a temporary chamber around the equipment in its natural habitat.

Proposed dimensions for the chamber are shown in Figure 1. A thermal analysis was performed to determine the loads incurred at the two temperature extremes. The analysis was based on the assumptions and conditions specified in Table I, and employed the equations shown in Table II. Symbols are defined in Table III. The analysis is shown in the Appendix. Calculated cooling loads and required airflow rates are presented in Figures 2, 3, and 4 and in Table IV.

Neg. pressure in chamber

Two modes of operation were considered. The first is the open flow mode in which room air is cooled, then injected into the chamber. The air which passes through the equipment is discharged into an exit vent. An amount of air equal to the incoming airflow flows from the chamber. If this rate is less than the flow rate through the equipment, all of the chamber discharge air is comprised of equipment discharge air. If the chamber flow rate exceeds the equipment flow rate, all of the equipment discharge air is included in the chamber exit air. The analysis determined the flow rate of chilled air necessary to achieve the specified chamber temperature. If the chamber must be maintained at 65°F ± 3°F, the minimum chamber entry temperature is 62°F. Figure 2 shows that the cooling load and required airflow rate associated with this requirement is extreme. The effect of increased temperature tolerance is to reduce the required airflow and the cooling load, as shown in Figure 2. It was assumed that it is not practical to pull air from the chilled air under the floor for flow rates in excess of 400 CFM. The amount of cooling required to chill room air is excessive.

If this mode of cooling were applied to the 90°F ± 3°F chamber condition, it would be necessary to heat room air prior to injecting it into the chamber. Minimum entry temperature would be 87°F. Because this mode is not practical for the 65°F condition, it was not considered for the 90°F condition.

The second mode of cooling involves a closed loop system in which chamber air is recirculated through a cooler. A small amount of makeup or ventilation air must be provided for the benefit of personnel in the chamber. This is assumed to be 100 CFM. At both chamber temperatures, air is assumed to enter the chamber at a temperature 3°F below nominal chamber temperature and return to the cooler at a temperature 3°F above the nominal chamber temperature. The required cooling loads and the required recirculation rates are shown in Figures 2 and 3 for the 65°F and 90°F chamber conditions, respectively. These loads are shown for a range of room air temperatures from 70°F to 80°F and for a range of air temperature under the floor from 62°F to 66°F.

Figures 3 and 4 show that the cooling loads associated with the recirculation mode are lower than that required for the open flow mode. The recirculation mode is recommended for this application. It should be observed that the required circulation flow rate is quite large. It is, in fact, much larger than that provided through air conditioners offering appropriate cooling capacity. Table V shows units of appropriate capacity and configuration, but the included fans do not provide the required airflow. If such a unit is purchased, it will probably be necessary to remove the included fan and use a fan of appropriate capacity in the return leg of the circulation ducting.

The high airflow rates associated with the ± 3°F air temperature tolerance can be greatly reduced if the temperature tolerance can be increased. Figures 3 and 4 show the effect of increasing the tolerance to ± 4°F and ± 5°F. The airflow rates associated with a tolerance of ± 5°F are close to that provided by the units identified in Table V. It appears likely that a booster fan added to the circuit could raise the flow rate to the level required if this tolerance is permitted.

If it is not possible to increase the temperature tolerance, the use of a single air conditioner unit poses certain problems. A separate blower will be needed to achieve the flow required. This blower must work against a head of approximately 3 inches H_2O. If such a blower must be purchased (See Table V), its cost is approximately half that of an air conditioner unit. The use of an airflow rate approximately double the intended flow rate through the air conditioner is expected to prevent condensate from dropping out as it is intended to do. It will instead be carried out of the air conditioner and may enter the chamber as water droplets. This can be minimized by passing the air through an appropriate screen. The entire task represents a development program.

Two separate air conditioner units of the type shown in Table V can be used for slightly greater materials cost and less development effort than that for a single unit. The two units will provide the appropriate airflow, no booster fan will be required, and condensate carry-over will not occur.

Whether one or two air conditioner units are employed, a heater is needed in each unit to adjust discharge temperature. An appropriate heater is identified in Table V. A precision controller is also needed. The unit identified in Table V is recommended.

An alternative to the procurement of an appropriate air conditioning unit(s) is to use a chilled water processing unit. Such a unit is available through the Facilities Department and includes a fan, heaters, and a precision temperature controller.

A preliminary specification is given in the Appendix for the design or selection of a suitable cooling system.

Paul Kendall

Paul Kendall
TADS/PNVS Thermodynamics

PK:lh

Attachments

TABLE I

ASSUMPTIONS USED IN ANALYSIS

1. ROOM TEMPERATURES FROM 70°F TO 80°F WERE CONSIDERED.

2. NOMINAL CHAMBER TEMPERATURES OF 65°F AND 90°F WERE CONSIDERED. AT BOTH CONDITIONS, TOLERANCES OF ± 3°F, ±4°F AND ± 5°F WERE CONSIDERED. ENTERING AIR TEMPERATURE WAS ASSUMED TO BE THE LOWER LIMIT SET BY THE TOLERANCE. EXIT AIR TEMPERATURE WAS ASSUMED TO BE THE UPPER LIMIT SET BY THE TOLERANCE.

3. EQUIPMENT HEAT LOAD = 3.5 KW DURING OPERATION OF THE EQUIPMENT.

4. PERSONNEL HEAT LOAD = 550 BTU/HR.

5. TOTAL WALL AND CEILING SURFACE AREA = 496 SQ. FT.

6. FLOOR AREA = 112 SQ. FT.

7. THE CONVECTIVE HEAT TRANSFER COEFFICIENT ON THE INSIDE SURFACES = 2.5 BTU/FT^2 - HR - °F.

8. THE CONVECTIVE HEAT TRANSFER COEFFICIENT ON THE OUTSIDE SURFACES OF THE WALLS AND CEILINGS = 1.5 BTU/FT^2 - HR - °F.

9. THE HEAT TRANSFER COEFFICIENT ON THE UNDERSIDE OF THE FLOOR = 2.5 BTU/FT^2 -HR - °F.

10. AIR TEMPERATURES UNDER THE FLOOR OF 62°F, 64°F, AND 66°F WERE CONSIDERED.

11. WALLS AND CEILING WERE ASSUMED TO BE FABRICATED FROM 2 INCH THICK RIGID FOAM WITH A THERMAL CONDUCTIVITY OF 0.021 BTU - FT/FT^2 - HR - °F.

12. THERMAL RESISTANCE THROUGH THE FLOOR PANELS WAS NEGLECTED.

13. IN THE CLOSED LOOP MODE, VENTILATION AIR WAS ASSUMED TO BE TAKEN FROM UNDER THE FLOOR AT THE RATE OF 100 CFM.

14. TOTAL AIRFLOW THROUGH THE EQUIPMENT = 1350 CFM.

15. IN THE OPEN FLOW MODE, THE EQUIPMENT LOAD IS DIMINISHED BY DISCHARGING ALL OR A PORTION OF THE EQUIPMENT COOLING DISCHARGE AIR FROM A VENT(S) IN THE TOP OF THE CHAMBER. THE PORTION OF THE EQUIPMENT LOAD THAT IS DISCHARGED THROUGH THE VENT(S) IS THE RATIO OF TOTAL CHAMBER THROUGH FLOW TO THE FLOW THROUGH THE EQUIPMENT, OR 100 PERCENT, WHEN THE THROUGH FLOW EQUALS OR EXCEEDS THE FLOW THROUGH THE EQUIPMENT.

TABLE II. EQUATIONS USED IN THE ANALYSIS

$$\frac{1}{(UA)_{wtc}} = \frac{1}{(Ah)_o} + \frac{\delta_w}{12 k_w A} + \frac{1}{(Ah)_i}$$

$$= \frac{1}{496 \times 1.5} + \frac{2}{12 \times .021 \times 496} + \frac{1}{496 \times 2.5}$$

$$(UA)_{wtc} = 55.1 \text{ BTU/HR-}^\circ\text{F}$$

$$\frac{1}{(UA)_F} = \frac{1}{(Ah)_o} + \frac{1}{(Ah_i)}$$

$$= \frac{1}{112 \times 2.5} + \frac{1}{112 \times 2.5}$$

$$(UA)_F = 140 \text{ BTU/HR-}^\circ\text{F}$$

$$q_G = (UA)_{wtc}(T_{AM} - T_{CH}) + (UA)_F (T_F - T_{CH})$$

$$q_G = 55.1 (T_{AM} - T_{CH}) + 140 (T_F - T_{CH})$$

$$T_{E2} - T_{CH} = \frac{3413 \, q_E}{60 \, W_E \, C_P}$$

$$W_E = \rho_{CH} Q_E = \frac{2116.2 \, Q_E}{53.345 (T_{CH} + 460)}$$

$$Q_E \approx 1350 \text{ CF}$$

$$W_E = \frac{53555}{(T_{CH} + 460)}$$

$$T_{E2} = \frac{3413 \times 3.5 \, (T_{CH} + 460)}{60 \times 53555 \times .24} + T_{CH}$$

$$T_{E2} = T_{CH} + .01549 (T_{CH} + 460) = 1.01549 \, T_{CH} + 7.125$$

FOR THE OPEN FLOW SYSTEM

$$q_{A/C} = 60 \, W_S \, C_P (T_{AM} - T_{S_1})$$

$$W_S = \rho_{AM} Q_S = \frac{2116.2 \, Q_S}{53.345 (T_{AM} + 460)} = \frac{39.67 \, Q_S}{T_{AM} + 460}$$

$$T_{S_1} = T_{CH} - \Delta t$$

$$q_{A/C} = 60 \times \frac{39.67 \, Q_S}{T_{AM} + 460} \times .24 \left(T_{AM} - T_{CH} + \Delta t \right)$$

TABLE II. Continued

OPEN FLOW SYSTEM, Continued

$$q_{A/C} = 571.25 \frac{Q_S(T_{AM} - T_{CH} + \Delta t)}{(T_{AM} + 460)}$$

$$q_{INT} = 3413\, q_E + q_P + q_G - q_V$$

$$q_{INT} = 3413 \times 3.5 + 550 + 55.1 (T_{AM} - T_{CH}) + 140 (T_F - T_{CH}) - q_V$$

$$q_V = 60 W_S C_P (T_{S2} - T_{S1})$$

$$T_{S2} - T_{S1} = 2\,\Delta t$$

$$q_V = 60 \times \frac{39.67\, Q_S}{T_{AM}+460} \times .24 \times 2\Delta t = 1142.5 \frac{Q_S \Delta t}{T_{AM}+460}$$

$$q_{INT} = 11945.5 + 550 + 55.1 (T_{AM} - T_{CH}) + 140 (T_F - T_{CH}) - 1142.5 \frac{Q_S \Delta t}{T_{AM}+460}$$

FOR $q_{INT} = 0$

$$Q_S = \frac{(T_{AM}+460)}{1142.5\, \Delta t} \left[12495.5 + 55.1 (T_{AM} - T_{CH}) + 140 (T_F - T_{CH}) \right]$$

CLOSED LOOP SYSTEM

$$q_{A/C} = 60\ W_S\ C_P (T_{S_2} - T_{S_1})$$

$$W_S = \frac{39.67\, Q_S}{(T_{CH} + \Delta t + 460)}$$

$$(T_{S_2} - T_{S_1}) = 2\,\Delta t$$

$$q_{A/C} = 60 \times \frac{39.67\, Q_S \times .24}{(T_{CH} + \Delta t + 460)} (2\Delta t) = \frac{1142.5\, Q_S\, \Delta t}{(T_{CH} + \Delta t + 460)}$$

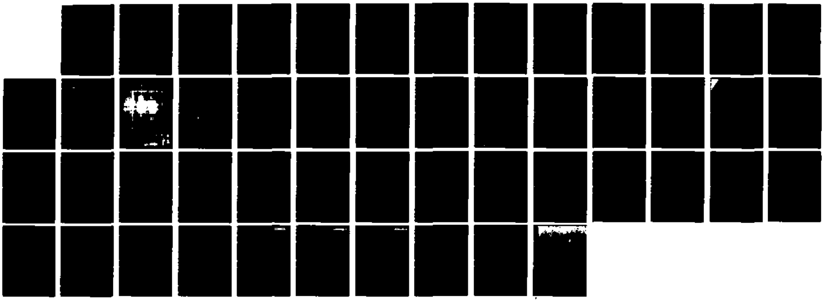
$$q_{A/C} = q_{INT} = 3413\, q_E + q_P + q_G - q_V$$

$$q_V = W_V (T_{E2} - T_F)\, 60\, C_P$$

$$q_V = Q_V \rho_V\, 60\, C_P \big(1.01549\, T_{CH} - 7.125 - T_F$$

AD-A134 296 E/O (ELECTROOOPTICAL) AUGMENTATION ENVIRONMENTAL TEMPERATURE TEST(U) MARTIN MARIETTA AEROSPACE ORLANDO FL A PAPKE SEP 83 OR-17385 DAAK50-82-G-0002 3/3

UNCLASSIFIED F/G 20/6 NL



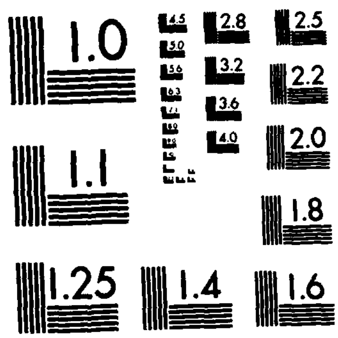


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TABLE II., Continued

CLOSED LOOP SYSTEM, Continued

$$P_v = \frac{2116.2}{53.345(T_F+460)} = \frac{39.67}{T_F+460}$$

$$q_v = Q_v\left(\frac{39.67}{T_F+460}\right) 60\times.24\left(1.01549\,T_{CH}+7.125-T_F\right)$$

Q_v = 100 CFM

$$q_v = 57125\,Q_v\,\frac{\cancel{(1.01549\,T_{CH}+7.125-T_F)}}{(T_F+460)}$$

$$q_{A/C} = 3413\times3.5 + 550 + 55.1\,(T_{AM}-T_{CH}) + 140\,(T_F-T_{CH}) - 57125\left(\frac{1.01549\,T_{CH}+7.125-T_F}{T_F+460}\right)$$

$$q_{A/C} = 12\,495.5 + 55.1\,(T_{AM}-T_{CH}) + 140\,(T_F-T_{CH}) - 57125\left[\frac{1.01549\,T_{CH}+7.125-T_F}{T_F+460}\right]$$

TABLE III. SYMBOLS USED IN ANALYSIS

SYMBOL	MEANING	UNITS
A	HEAT TRANSFER AREA	~FT^2
C_p	SPECIFIC HEAT OF AIR	~BTU/LB-°F
h	CONVECTIVE HEAT TRANSFER COEFFICIENT	~BTU/HR-FT^2-°F
k	THERMAL CONDUCTIVITY OF FOAM	~ BTU/FT^2-HR-°F/FT
Q_E	AIRFLOW THROUGH EQUIPMENT	~CFM
Q_S	REQUIRED VOLUMETRIC FLOW RATE OF COOLED AIR	~CFM
Q_V	FLOW RATE OF VENTILATION AIR *	~CFM
q_E	EQUIPMENT HEAT LOAD	~KW
q	HEAT FLOW RATE	~BTU/HR
T	TEMPERATURE	~ °F
Δt	ALLOWABLE DEVIATION FROM NOMINAL CHAMBER AIR TEMPERATURE	~ °F
U	OVER-ALL HEAT TRANSFER COEFFICIENT	~ BTU/HR-FT^2-°F
W	MASS FLOW RATE OF AIR	~LB/MIN
δ	INSULATION THICKNESS	~ INCHES
ρ	DENSITY OF AIR	~ LB/FT^3

SUBSCRIPT	MEANING
A/C	AIR CONDITIONER
C	CEILING
CH	CHAMBER
E	EQUIPMENT
E2	EQUIPMENT DISCHARGE
F	UNDER THE FLOOR AIR
G	GAIN THROUGH WALLS, FLOOR, AND CEILING
i	INSIDE SURFACE
o	OUTSIDE SURFACE
P	PERSONNEL
S	SUPPLY
V	VENTILATION
W	WALL

* FOR OPEN FLOW MODE, $Q_S = Q_V$. FOR CLOSED LOOP MODE, Q_V = 100 CFM.

TABLE IV. PREDICTED COOLING LOADS AND CIRCULATION FLOW RATES

CHAMBER AIR TEMP °F	UNDER-FLOOR AIR TEMP °F	ROOM AMBIENT TEMPERATURE °F	COOLING LOAD BTU/HR	MINIMUM AIR CIRCULATION RATE AT TEMP TOLERANCE INDICATED ~CFM		
				± 3°F *	± 4°F	± 5°F
65	62	70	12351	1903	1430	1146
		75	12627	1945	1462	1172
		80	12902	1988	1495	1198
	64	70	12631	1946	1462	1172
		75	12907	1988	1494	1197
		80	13182	2031	1526	1223
	66	70	12911	1989	1493	1197
		75	13187	2031	1526	1223
		80	13462	2074	1558	1249
90	62	70	3478	561	422	338
		75	3753	644	484	388
		80	4029	726	546	437
	64	70	3991	606	455	365
		75	4266	688	517	414
		80	4542	771	579	464
	66	70	4502	650	488	391
		75	4777	733	551	441
		80	5053	815	613	491

* SPECIFIED TOLERANCE

TABLE V. AIRCONDITIONING & TEMPERATURE CONTROL EQUIPMENT

ITEM & DESCRIPTION	QUANTITY REQUIRED	
	OPTION I	OPTION II
AIR CONDITIONER UNIT STOCK NUMBER 3C 296 * PAGE 779 * UNIT COST = $ 966 * CAPACITY @ 230VAC = 27,500 BTU/HR DESIGN AIRFLOW @ 0.2 INCH H_2O HEAD = 1190 CFM	1	2
HEATER STOCK NUMBER 2E625 * PAGE 778 * UNIT COST = $97. * CAPACITY = 30,717 BTU/HR	1	2
BLOWER STOCK NUMBER 7C410 * PAGE 910 * UNIT COST = $ 377 * CAPACITY @ 3 INCH H_2O HEAD = 1927 CFM	1	0
PRECISION TEMPERATURE CONTROLLER THERMOTRON 5200 SYSTEM FOR THERMOCOUPLE ACTUATION UNIT COST ≈ $ 700	1	1
TOTAL COST	$ 2140	$ 2826

* GRAINGER CATALOG # 358, WINTER 1980-81

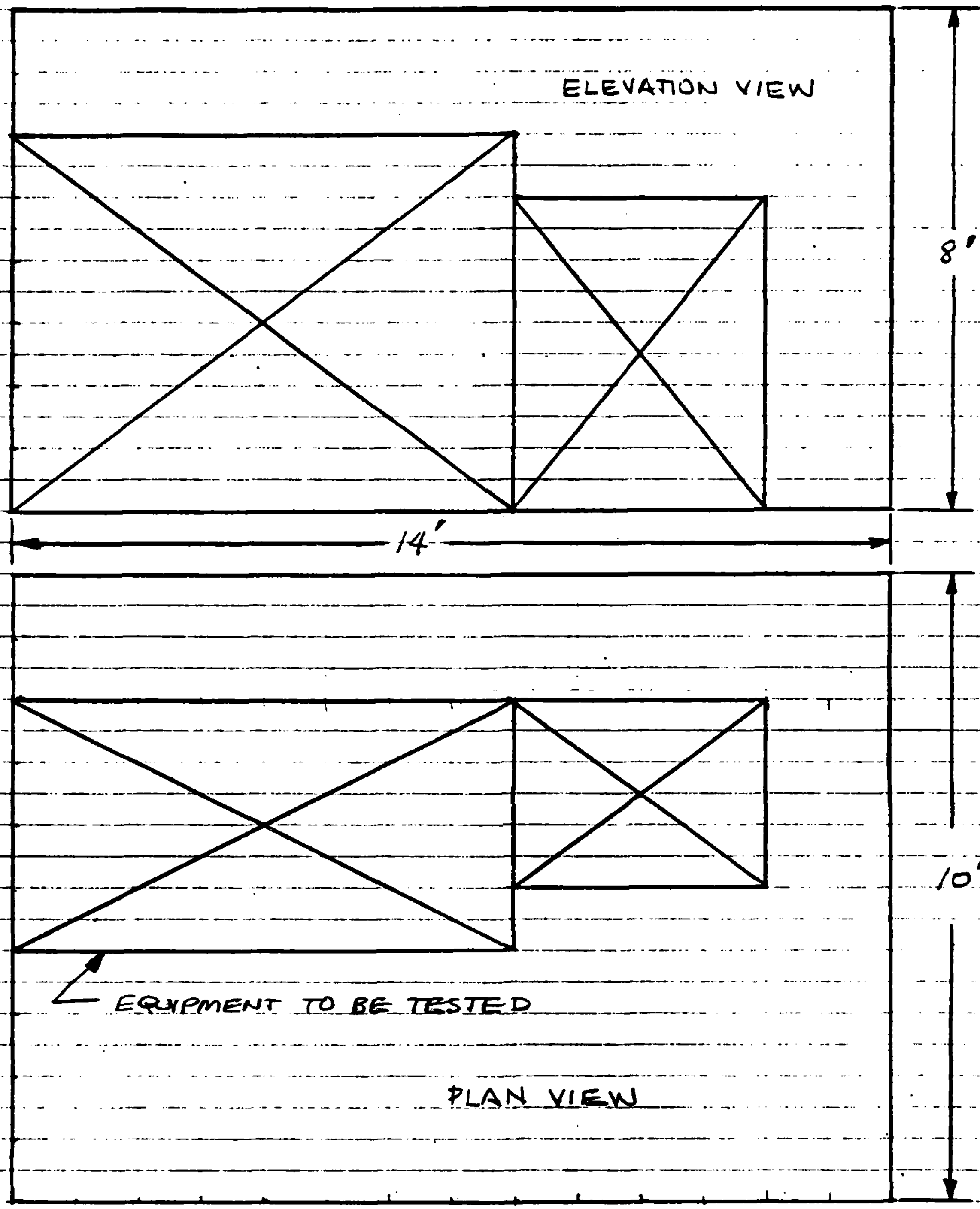


FIGURE 1. CHAMBER DIMENSIONS ASSUMED FOR ANALYSIS

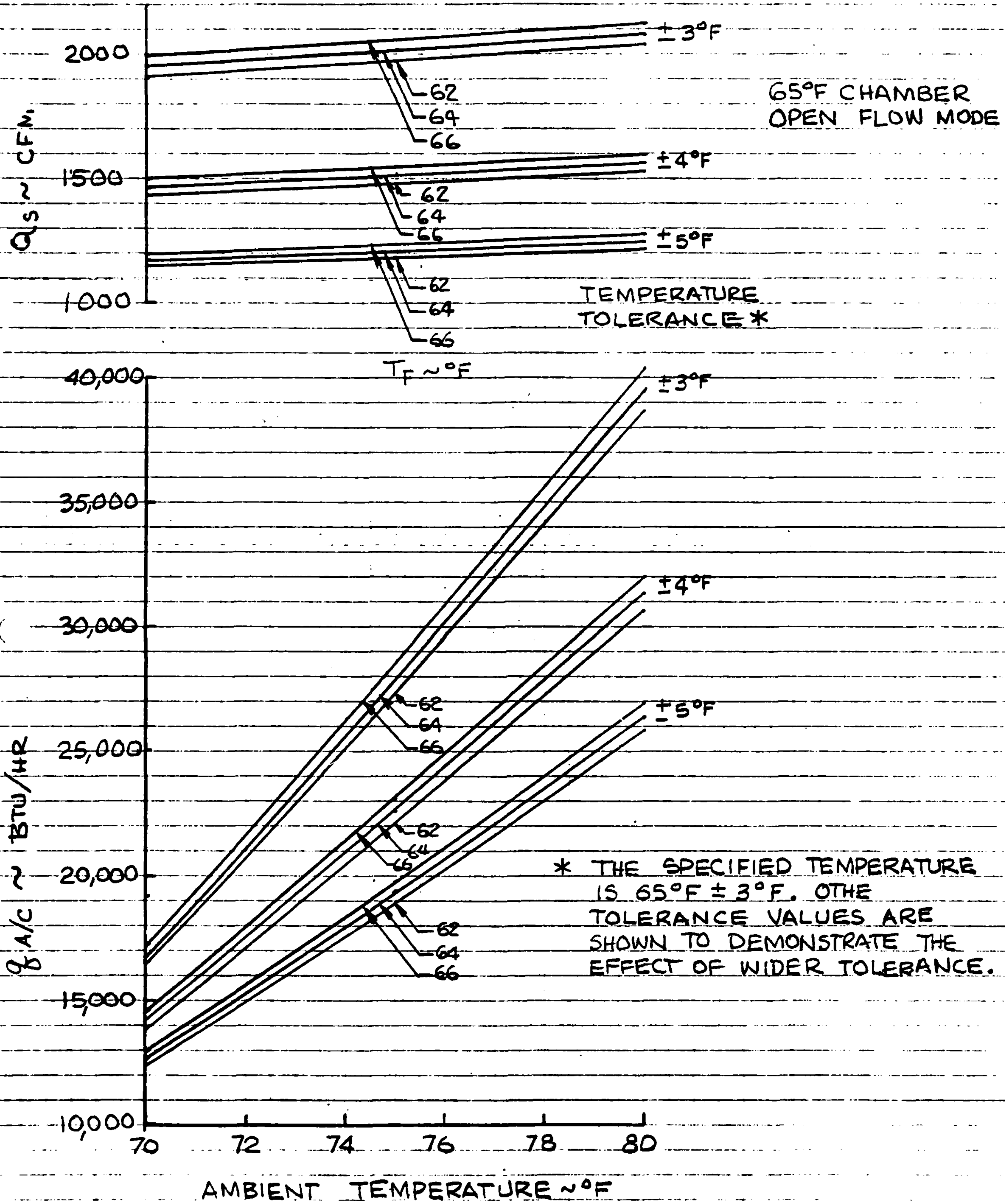


FIGURE 2. REQUIREMENTS FOR 65°F OPERATION IN THE OPEN FLOW MODE

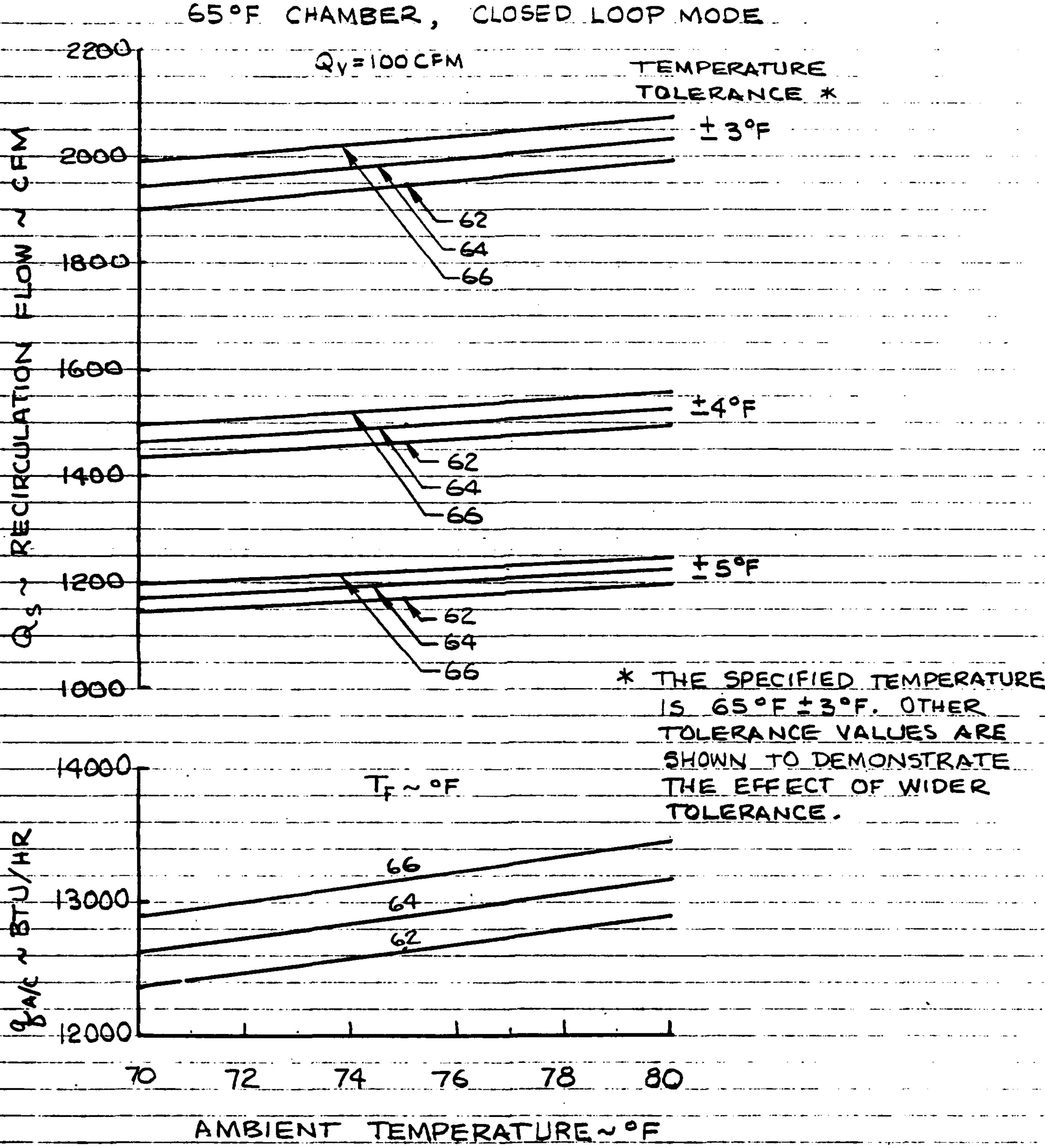


FIGURE 3. REQUIREMENTS FOR 65°F OPERATION IN THE CLOSED LOOP MODE

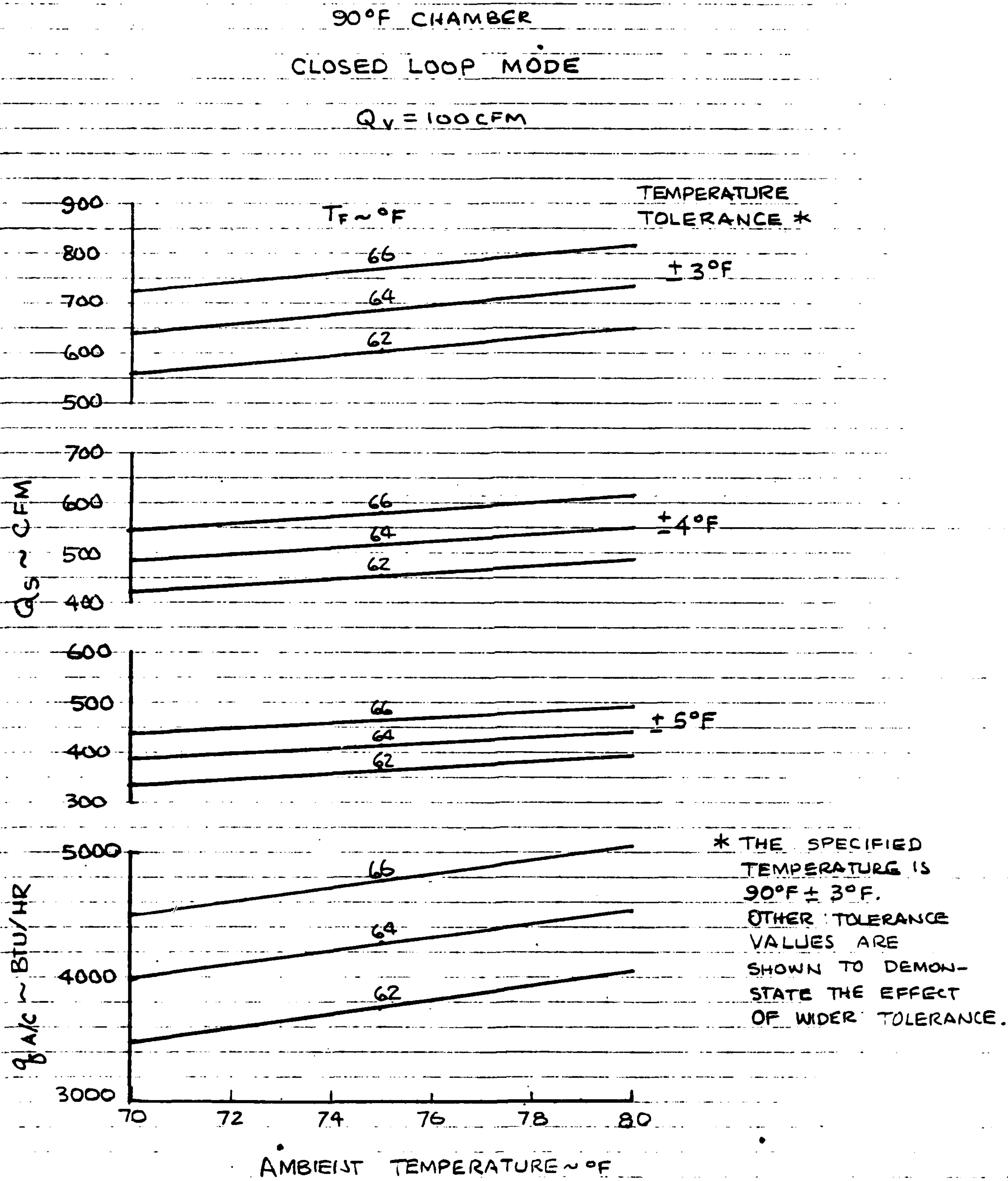


FIGURE 4. REQUIREMENTS FOR 90°F OPERATION

APPENDIX

PRELIMINARY SPECIFICATIONS FOR A COOLING SYSTEM FOR THE PGSE AUGMENTATION EQUIPMENT TEMPERATURE TEST CHAMBER

1. The cooling system shall provide for operation of the chamber with an internal air temperature maintained at either of two levels. These are: 65°F ± 3°F and 90°F ± 3°F.

2. The active primary load in the chamber is 3.5 kw. The air circulation rate through the equipment contained in the chamber is approximately 1350 CFM. Additional loads include 550 BTU/HR personnel load, lights, a circulation fan, and loss or gain through the chamber walls and floor.

3. The cooling system shall be capable of establishing either of the chamber conditions within 2 hours of start, without the active primary heat load in the chamber.

4. Cooling and initial temperature adjustment shall be accomplished by extracting air from the chamber, passing it over appropriate cooling coils (a heater will be required to initially establish the 90°F condition) and returning the air to the chamber.

5. Distribution and flow rate of the recirculated air shall be as required to achieve the specified temperature tolerance. Minimum flow rates are specified in Table IV. Attention shall also be given to providing a "comfort zone" in front of the equipment under test. If possible, air movement in this region shall not exceed 120 FPM.

6. Control of chamber temperature shall be achieved by the use of an electric heater in series with the cooling coils. Air temperature at an appropriate location in the chamber shall be sensed with a thermocouple and a signal provided to a temperature controller which shall operate the heaters as a means of temperature control.

7. Ventilation air will be introduced into the chamber at a rate no less than 100 CFM. It is suggested that this be obtained by removing a floor panel and replacing it with a panel with an appropriate orifice. A ceiling vent will also be provided. It's location should insure that the air leaving through the vent is a portion of the air leaving the center post section of the test bench.

8. The cooling equipment may consist either of an air conditioning unit or of a chilled water cabinet.

9. If permission is given to open the temperature control tolerance, air circulation rates can be reduced as shown in Table IV.

TABLE A-I. OPEN FLOW SYSTEM ANALYSIS

① T_{CH} °F	② T_{AM} °F	③ T_F °F	④ $55.1(T_{AM}-T_{CH})$	⑤ $140(T_F-T_{CH})$	⑥ 12495.5 + ④ + ⑤	⑦ $\left(\frac{T_{AM}+460}{1142.5}\right)$ ⑥	⑧ Δt °F	⑨ Q_s CFM	⑩ q_s A/C BTU/HR
65	70	62	275.5	−420	12351	5729.6	3	1910	16469
							4	1432	13891
							5	1146	12352
		64	275.5	−140	12631	5859.5	3	1953	16840
							4	1465	14211
							5	1172	12632
		66	275.5	+140	12911	5989.3	3	1996	17211
							4	1497	14525
							5	1198	12912
	75	62	551	−420	12626.5	5912.6	3	1971	27359
							4	1478	22094
							5	1183	18947
		64	551	−140	12906.5	6043.7	3	2015	27970
							4	1511	22581
							5	1209	19364
		66	551	+140	13866	6174.9	3	2058	28561
							4	1544	23081
							5	1235	19780
	80	62	826.5	−420	12902	6098.1	3	2033	38712
							4	1525	30652
							5	1220	25812
		64	826.5	−140	13182	6230.4	3	2077	39550
							4	1558	31315
							5	1246	26362
		66	8265	+140	13462	6362.8	3	2121	40387
							4	1591	31978
							5	1273	26933

TABLE A-II. CLOSED LOOP SYSTEM ANALYSIS FOR 90°F CHAMBER

① T_{CH} °F	② T_{AM} °F	③ T_F °F	④ $55.1(T_{AM}-T_{CH})$	⑤ $140(T_F-T_{CH})$	⑥	⑦ $q_{A/C}$ BTU/HR	⑧ Δt °F	⑨ $\left(\frac{T_{CH}+\Delta T+460}{1142.5\,\Delta t}\right)$	⑩ Q_s CFM
90	70	62	−1102	−3920	3996	3478	3	.16134	561
							4	.12123	422
							5	.097155	338
		64		−3640	3763	3991	3	.16134	644
							4	.12123	484
							5	.097155	388
		66		−3360	3532	4502	3	.16134	726
							4	.12123	546
							5	.097155	437
	75	62	−826.5	−3920	3996	3753	3	.16134	606
							4	.12123	455
							5	.097155	365
		64		−3640	3763	4266	3	.16134	688
							4	.12123	517
							5	.097155	414
		66		−3360	3532	4777	3	.16134	771
							4	.12123	579
							5	.097155	464
	80	62	−551	−3920	3996	4029	3	.16134	650
							4	.12123	488
							5	.097155	391
		64		−3640	3763	4542	3	.16134	733
							4	.12123	551
							[illegible]	[illegible]7155	441
		66		−3360	3532	5053	[illegible]	.1[illegible]134	815
							4	.12123	613
							5	.097155	491

$$⑥ = 57125\,(1.01549\,T_{CH} + 7.125 - T_F)/(T_F + 460)$$

$$⑦ \cdot\ 12495.5 + ④ + ⑤ - ⑥$$

TABLE A-III. CLOSED LOOP SYSTEM ANALYSIS FOR 65°F CHAMBER

① T_{CH} °F	② T_{AM} °F	③ T_F °F	④ $55.1(T_{AM}-T_{CH})$	⑤ $140(T_F-T_{CH})$	⑥	⑦ $q_{A/C}$ BTU/HR	⑧ Δt °F	⑨ $\left(\frac{T_{CH}+\Delta t+460}{1142.5\,\Delta t}\right)$	⑩ Q_s CFM
65	70	62	275.5	−420	1218.2	12351	3	.15405	1903
							4	.11575	1430
							5	.092779	1146
		64	275.5	−140	995.5	12631	3	.15405	1946
							4	.11575	1462
							5	.092779	1172
		66	275.5	+140	774.5	12911	3	.15405	1989
							4	.11575	1495
							5	.092779	1198
	75	62	551	−420	1218.2	12627	3	.15405	1945
							4	.11575	1462
							5	.092779	1172
		64	551	−140	995.5	12907	3	.15405	1988
							4	.11575	1494
							5	.092779	1197
		66	551	+140	774.5	13187	3	.15405	2031
							4	.11575	1526
							5	.092779	1223
	80	62	826.5	−420	1218.2	12902	3	.15405	1988
							4	.11575	1493
							5	.092779	1197
		64	826.5	−140	995.5	13182	3	.15405	2031
							4	.11575	1526
							5	.092779	1223
		66	826.5	+140	774.5	13462	3	.15405	2074
							4	.11575	1558
							5	.092779	1249

⑥ $= 57125\,(1.01549\,T_{CH} + 7.125 - T_F)/(T_F + 460)$

⑦ $= 12495.5 +$ ④ $+$ ⑤ $-$ ⑥

TEMPERATURE CHAMBER
E10 AUGMENTATION

1.) Parts List

1 x4 Cedar Strips
1 x 6 Cedar Strips
1/4 x 48x96 LUAN
2"x 48 x96 Styrofoam
Rubber Cement (For Foam)
1/8" Self Adhesive Weather Strip
2" 1/4 - 20 Bolts / Washers / Nuts
WHT Latex Paint

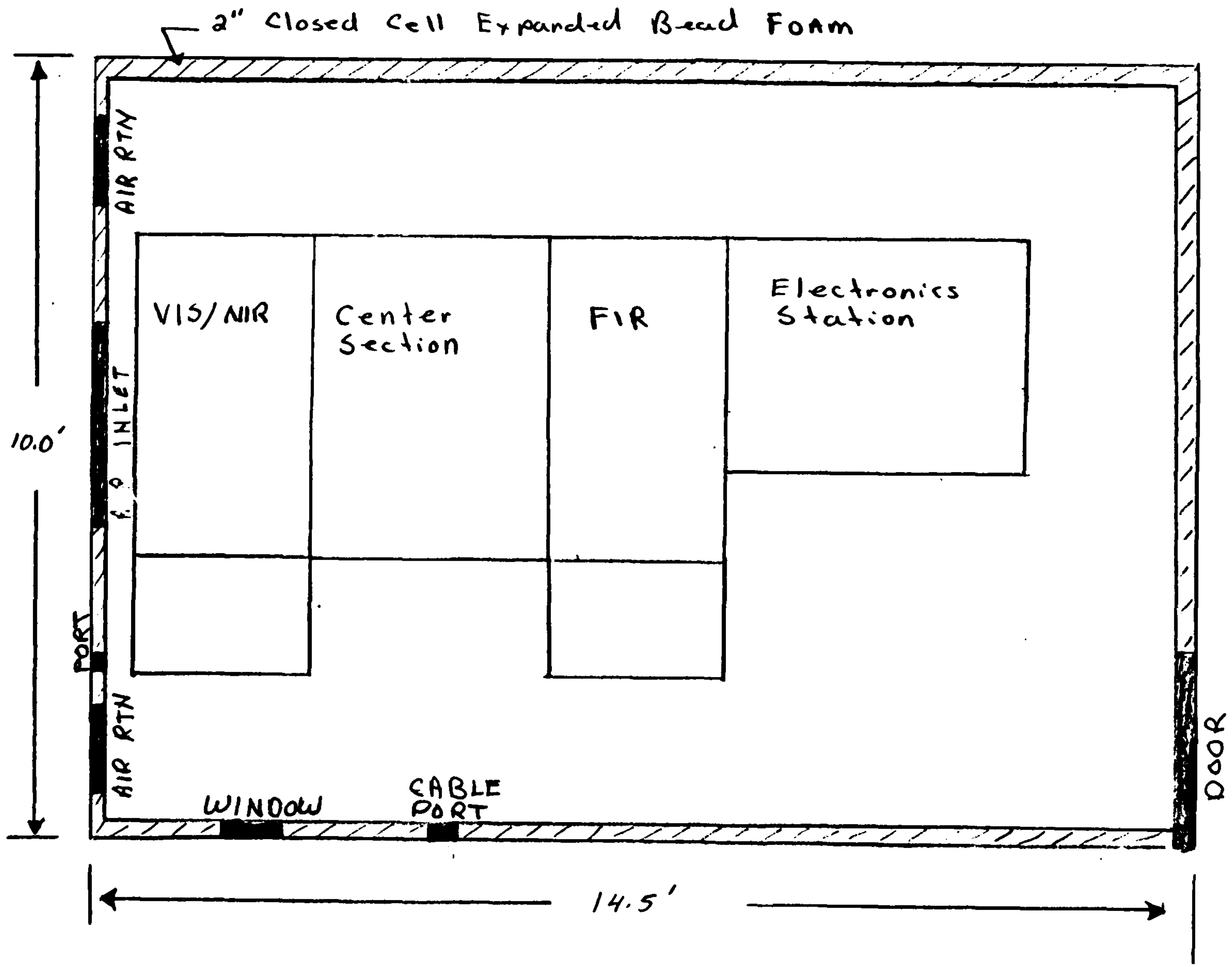
2.) Dimensions

Width = 10.0 ft.
Height = 8.0 ft.
Length = 14.5 ft.

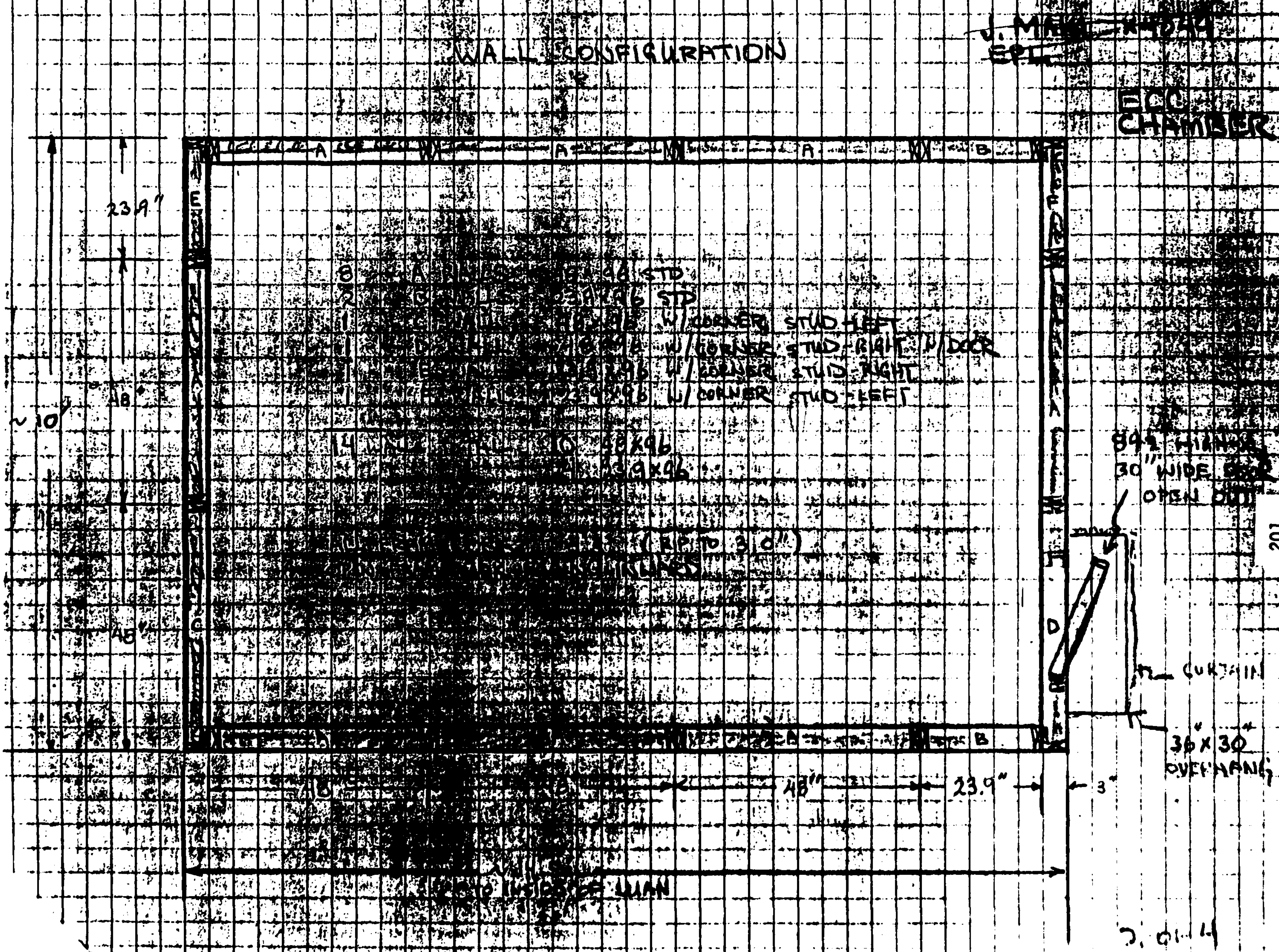
3) Thermal Data

Inlet Air - 58°F, 1000 CFM
20KW Heat Capability
Thermostatically Controlled

TEMP CHAMBER - E/O AUGMENTATION
TOP VIEW

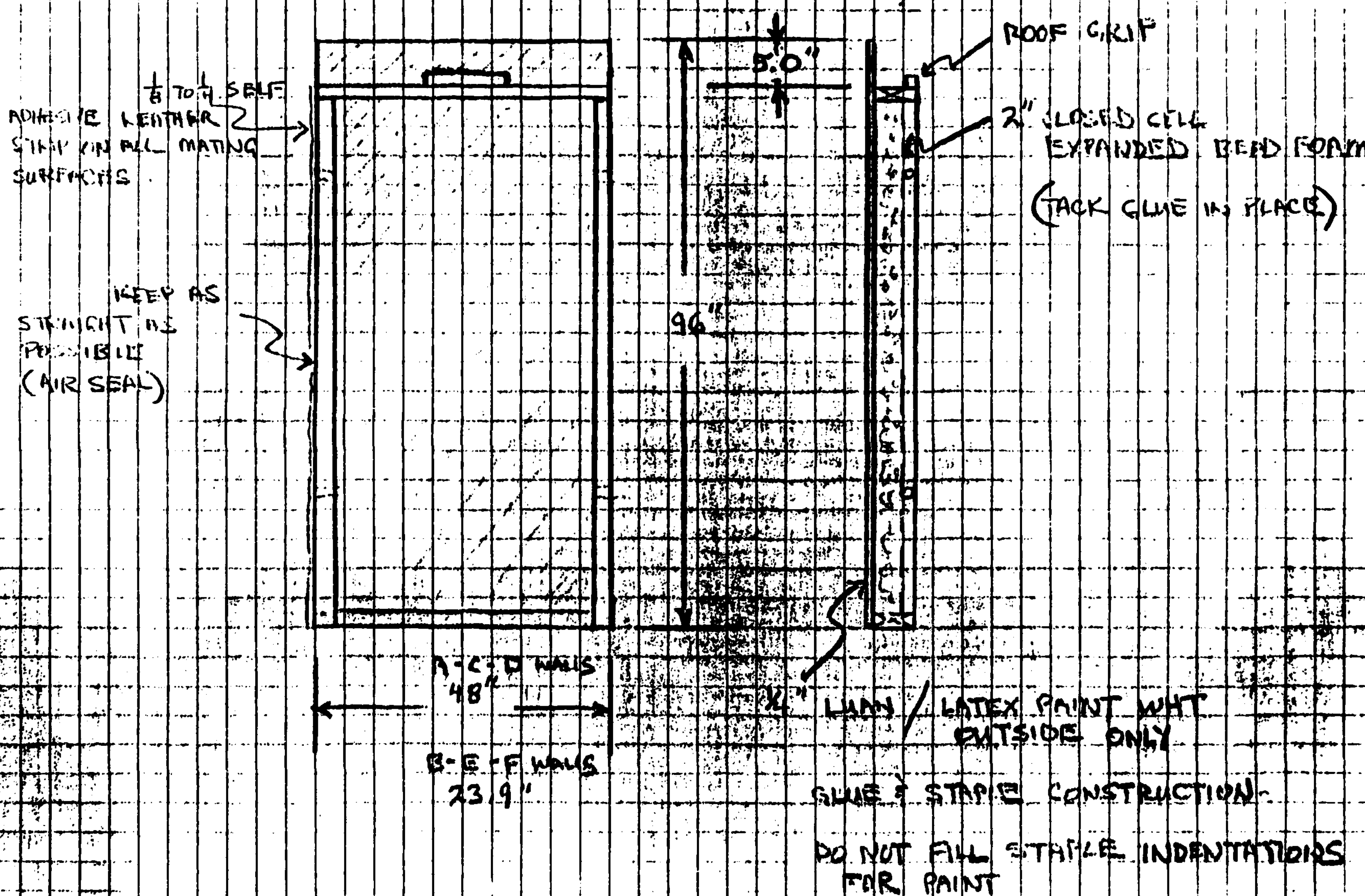


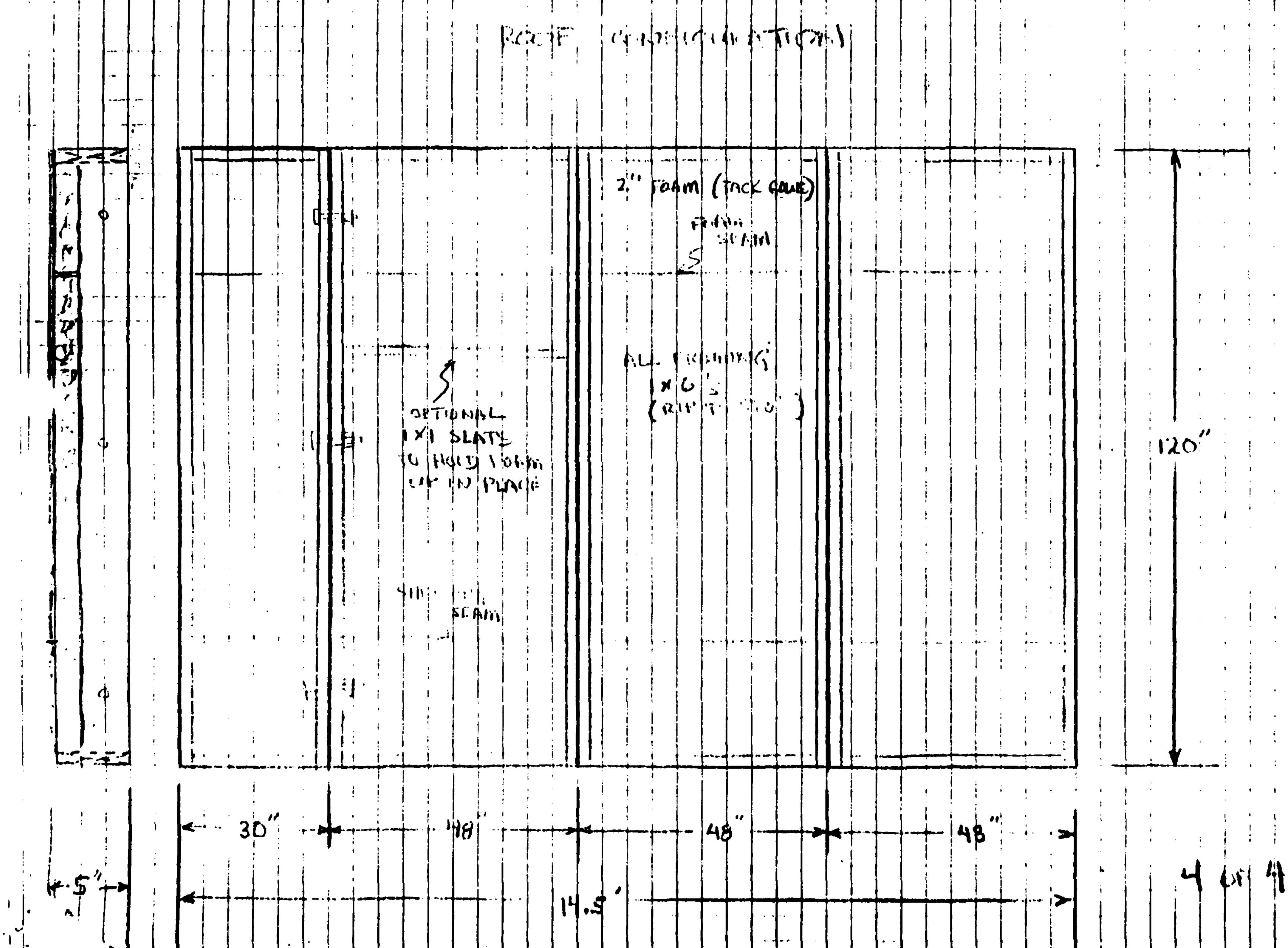
Page



WALL CONFIGURATION
ECC
CHAMBER
23.9"
48"
~10'
STD
STD
W/ CORNER STUD LEFT
W/ CORNER STUD RIGHT W/DOOR
W/ CORNER STUD RIGHT
W/ CORNER STUD LEFT
48X96
23.9X96
OPEN OUT
CURTAIN
36" X 30"
OVERHANG
48"
23.9"
3"

STD WALL CONFIGURATION




2" FOAM (TACK GLUE)
OPTIONAL
1X1 SLATS
TO HOLD FOAM
UP IN PLACE
120"
30"
48"
48"
48"
5"
14.5'
4 OF 4

APPENDIX A-6

ATP SIGN OFF/OPTICAL TEST DATA AND
SIGN OFF SHEETS OPTICAL DATA SHEET

Low Temp Sign off Sheet - ATP
8-15-83

APPENDIX A

TADS PNVS AUGMENTATION UNIT TEST ACCEPTANCE REPORT SIGN-OFF

ELECTRONICS

Unit	Paragraph	Test Operator and Witness Initials
Calculate	4.1.1.2	TJR JJW
Parallel Buss	4.1.2.2	TJR JJW
Matrix Switch	4.1.3.2	TJR JJW
A/D Converter	4.1.4.2	TJR JJW
Digitizer	4.1.5.2	TJR JJW
Fixed Power Supply	4.1.6.2	TJR JJW
Programmable Power Supply	4.1.7.2	TJR JJW
Resolver Simulator	4.1.8.2	TJR JJW
Programmable Pulse Generator	4.1.9.2	TJR JJW
Video Signal Generator	4.1.10.2	TJR JJW

Z58569.28/4013/U

	FSCM NO.	DWG. NO.
A	58260	13082803
	REV. H	Sheet 29

APPENDIX A

TADS PNVS AUGMENTATION UNIT TEST ACCEPTANCE REPORT SIGN-OFF

OPTICAL SIGNAL ANALYZER

Unit	Paragraph	Test Operator and Witness Initials
Filters	4.2.1.2	TJR [illegible]
Shutter	4.2.2.2	TJR [illegible]
Focus	4.2.3.2	TJR [illegible]
Photo Multiplier Tube	4.2.4.2	TJR [illegible]
IVD Electronics	4.2.5.2	TJR [illegible]

Z58569.29/4040

	FSCM NO.	DWG. NO.
A	58260	13082803
	REV. H	SHEET 30

APPENDIX A

TADS PNVS AUGMENTATION UNIT TEST ACCEPTANCE REPORT SIGN-OFF

OPTICAL SIGNAL GENERATOR

Unit	Paragraph	Test Operator and Witness Initials
Filters	4.3.1.2	TJR [illegible]
Mirror	4.3.2.2	TJR [illegible]
Diffuser/Filter	4.3.3.2	TJR [illegible]
Lamp	4.3.4.2	TJR [illegible]

A	FSCM NO. 58260	DWG. NO. 13082803
	REV. H	SHEET 31

258569.30/4040

APPENDIX A

TADS PNVS AUGMENTATION UNIT TEST ACCEPTANCE REPORT SIGN-OFF

DAY COLLIMATOR

Unit	Paragraph	Test Operator and Witness Initials
Shutter	4.4.1.2	TJR
A Mirror	4.4.2.2	TJR
T Lamp	4.4.3.2	TJR
External Source/Target	4.4.4.2	TJR
Focus	4.4.5.2	TJR
Variable Filter	4.4.6.2	TJR
External Radiometer	4.4.7.2	TJR
B Mirror	4.4.8.2	TJR
Internal Camera	4.4.9.2	TJR
External Camera	4.4.10.2	TJR
Laser	4.4.11.2	TJR
Internal Radiometer	4.4.12.2	TJR

	FSCM NO.	DWG. NO.	
A	58260	13082803	
		REV. H	SHEET 32

258569.31/4040

APPENDIX A

TADS PNVS AUGMENTATION UNIT TEST ACCEPTANCE REPORT SIGN-OFF

FIR COLLIMATOR

Unit	Paragraph	Test Operator and Witness Initials
Shutter	4.5.1.2	TJR [illegible]
Target	4.5.2.2	TJR [illegible]
Aperture	4.5.3.2	TJR [illegible]
Boresight	4.5.4.2	TJR [illegible]

COMMON MODULE

Unit	Paragraph	Test Operator and Witness Initials
Temperatures	4.6.1.2	TJR [illegible]
Miscellaneous Interlocks	4.6.2.2	TJR [illegible]
Laser Power and Interlock	4.6.3.2	TJR [illegible]

NOTES

1. Computer generated data will be added to this appendix and labeled as test data, dated, and signed by appropriate individual.

2. Hardware status including EPROMS relative to released engineering, will be defined at the time of the acceptance test procedure.

3. The final version of the self-test source software listing and tape be provided at the time of the acceptance test. The revision level of the RCA system software will be identified at the acceptance test.

	FSCM NO.	DWG. NO.
A	58260	13082803
	REV. H	SHEET 33

Z58569.32/4040

High Temp
ATP Sign off Sheet
8-17-83

APPENDIX A

TADS PNVS AUGMENTATION UNIT TEST ACCEPTANCE REPORT SIGN-OFF

ELECTRONICS

Unit	Paragraph	Test Operator and Witness Initials	
Calculate	4.1.1.2	TJR	[illegible]
Parallel Bus	4.1.2.2	TJR	[illegible]
Matrix Switch	4.1.3.2	TJR	[illegible]
A/D Converter	4.1.4.2	TJR	[illegible]
Digitizer	4.1.5.2	TJR	[illegible]
Fixed Power Supply	4.1.6.2	TJR	[illegible]
Programmable Power Supply	4.1.7.2	TJR	[illegible]
Resolver Simulator	4.1.8.2	TJR	[illegible]
Programmable Pulse Generator	4.1.9.2	TJR	[illegible]
Video Signal Generator	4.1.10.2 FAILED comp sync.	TJR	[illegible]

Pulled VSG board. verified sync. + Trigger signals still good. checked cable. cable Ok. Reinserted board. ATP Test check good. Possible Thermal Problem
TJR [illegible]

Z58569.28/4013/U

	FSCM NO.	DWG. NO.
A	58260	13082803

REV. H

Sheet 29

APPENDIX A

TADS PNVS AUGMENTATION UNIT TEST ACCEPTANCE REPORT SIGN-OFF

OPTICAL SIGNAL ANALYZER

Unit	Paragraph	Test Operator and Witness Initials
Filters	4.2.1.2	TJR
Shutter	4.2.2.2	TJR
Focus	4.2.3.2	TJR
Photo Multiplier Tube	4.2.4.2 Will Rerun after adjusting PMT controller	TJR
IVD Electronics	4.2.5.2	TJR

Re-Ran Successfully @ 1540hr, 17 Aug after adjusting PMT controller coldness adjustment knob

TJR

	FSCM NO.	DWG. NO.
A	58260	130[illegible]

REV. H

SHEET 30

APPENDIX A

TADS PNVS AUGMENTATION UNIT TEST ACCEPTANCE REPORT SIGN-OFF

OPTICAL SIGNAL GENERATOR

Unit	Paragraph	Test Operator and Witness Initials
Filters	4.3.1.2	TJR [illegible]
Mirror	4.3.2.2	TJR [illegible]
Diffuser/Filter	4.3.3.2	TJR [illegible]
Lamp	4.3.4.2	TJR [illegible]

APPENDIX A

TADS PNVS AUGMENTATION UNIT TEST ACCEPTANCE REPORT SIGN-OFF

DAY COLLIMATOR

Unit	Paragraph	Test Operator and Witness Initials
Shutter	4.4.1.2	TJR [illegible]
A Mirror	4.4.2.2	TJR [illegible]
T Lamp	4.4.3.2	TJR [illegible]
External Source/Target	4.4.4.2	TJR [illegible]
Focus	4.4.5.2	TJR [illegible]
Variable Filter	4.4.6.2	TJR [illegible]
External Radiometer	4.4.7.2	TJR [illegible]
B Mirror	4.4.8.2	TJR [illegible]
Internal Camera	4.4.9.2	TJR [illegible]
External Camera	4.4.10.2	TJR [illegible]
Laser	4.4.11.2	TJR [illegible]
Internal Radiometer	4.4.12.2	TJR [illegible]

	FSCM NO.	DWG. NO.
A	58260	13082803
	REV. H	SHEET 32

APPENDIX A

TADS PNVS AUGMENTATION UNIT TEST ACCEPTANCE REPORT SIGN-OFF

FIR COLLIMATOR

Unit	Paragraph	Test Operator and Witness Initials
Shutter	4.5.1.2	TJR
Target	4.5.2.2	TJR
Aperture	4.5.3.2	TJR
Boresight	4.5.4.2	TJR

COMMON MODULE

Unit	Paragraph	Test Operator and Witness Initials
Temperatures	4.6.1.2	TJR
Miscellaneous Interlocks	4.6.2.2	TJR
Laser Power and Interlock	4.6.3.2	TJR

NOTES

1. Computer generated data will be added to this appendix and labeled as test data, dated, and signed by appropriate individual.

2. Hardware status including EPROMS relative to released engineering, will be defined at the time of the acceptance test procedure.

3. The final version of the self-test source software listing and tape be provided at the time of the acceptance test. The revision level of the RCA system software will be identified at the acceptance test.

	FSCM NO.	DWG. NO.	
A	58260	13082803	
		REV. H	SHEET 33

8/16/83
DRM

E/O AUGMENTATION

ENVIRONMENTAL TEMPERATURE TEST

DATA SHEET

	DBA 20.03°C 65°F	DBA 34.92°C 90°F	
1. FIR MODULE			
A) BORESIGHT	Y = 15 sec X = −2 sec	Y = 15 sec X = ~~−~~12 sec	
B) FOCUS	set	Same	
C) ATP	X	X	PASSED
			Δ 2.0 = x −11.2 = y
2. VIS/NIR MODULE			
A) BORESIGHT	55.7 19.6	53.7 30.8	
B) FOCUS	17.35 Line width	16.82	
C) ATP	X	X	PASSED
3. OSG			
A) BORESIGHT	Displacement		Total
TV	Δ Y = .0080" Δ X = .0004" ~~57 sec~~	Δ Y = .0082 Δ X = −.0008	Δ Y = .0002 Δ X = −.0012
EO MUX	Y = [redacted] X = +72 sec	X = 80 sec ~~Y = 41 sec~~	Δ X = 08 sec Δ Y = 16 sec
B) FOCUS	Shift		
TV	.0173	.0160	Δ = .0013
EO MUX	set	Same	
C) ATP	X	X	PASSED
4. OSA			
A) ATP	X	X	PASSED

UUT PROGRAM: LINWID2.1C COMPILED ON: 16-AUG-83 9:20:50
TESTED: 8/16/83 9:56:35 USING SYSTEM TADS/PNVS 4

JDM
DRM

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

Focus

C A L I B R A T I O N S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

65°

8/16

LINE WIDTH = 22.06

LINE WIDTH = 17.52

LINE WIDTH = 18.57

Focus VIS/NIR

LINE WIDTH = 19.99

LINE WIDTH = 16.76

LINE WIDTH = 18.33

LINE WIDTH = 18.94

LINE WIDTH = 17.30

LINE WIDTH = 17.32

LINE WIDTH = 18.69

LINE WIDTH = 19.41

LINE WIDTH = 17.69

LINE WIDTH = 16.67

LINE WIDTH = 19.45

THIS GIVES AN AVERAGE RELATIVE LINE WIDTH OF 18.66
14 GOOD DATA SAMPLES WERE TAKEN.

LINE WIDTH = 18.25

LINE WIDTH = 17.68

LINE WIDTH = 17.61

LINE WIDTH = 17.45

LINE WIDTH = 17.38

LINE WIDTH = 16.94

LINE WIDTH = 16.73

LINE WIDTH = 17.27

LINE WIDTH = 17.20

LINE WIDTH = 16.66

THIS GIVES AN AVERAGE RELATIVE LINE WIDTH OF 17.34
10 GOOD DATA SAMPLES WERE TAKEN.

LINE WIDTH = 17.69

LINE WIDTH = 17.00

LINE WIDTH = 17.36

LINE WIDTH = 17.65

LINE WIDTH = 17.42

LINE WIDTH = 17.39

LINE WIDTH = 17.13

LINE WIDTH = 16.29

LINE WIDTH = 16.48

LINE WIDTH = 16.97

LINE WIDTH = 17.46

LINE WIDTH = 17.77

LINE WIDTH = 17.97

LINE WIDTH = 17.89

LINE WIDTH = 17.15

LINE WIDTH = 17.23

LINE WIDTH = 17.36

LINE WIDTH = 15.83

LINE WIDTH = 18.05

LINE WIDTH = 17.48

LINE WIDTH = 17.11

THIS GIVES AN AVERAGE RELATIVE LINE WIDTH OF 17.36
21 GOOD DATA SAMPLES WERE TAKEN.

LINE WIDTH = 18.05

LINE WIDTH = 17.30

LINE WIDTH = 16.66

LINE WIDTH = 16.54

LINE WIDTH = 18.88

LINE WIDTH = 18.90

LINE WIDTH = 19.86

LINE WIDTH = 19.35

LINE WIDTH = 18.05

LINE WIDTH = 19.06

LINE WIDTH = 17.96

LINE WIDTH = 18.10

LINE WIDTH = 19.33

LINE WIDTH = 21.04

LINE WIDTH = 19.40

LINE WIDTH = 18.42

LINE WIDTH = 19.76

LINE WIDTH = 21.26

LINE WIDTH = 19.28

LINE WIDTH = 17.57

LINE WIDTH = 18.85

LINE WIDTH = 19.50

LINE WIDTH = 18.60

LINE WIDTH = 19.28

LINE WIDTH = 19.89

LINE WIDTH = 16.73

LINE WIDTH = 18.62

LINE WIDTH = 20.52

LINE WIDTH = 18.86

LINE WIDTH = 17.64

LINE WIDTH = 19.48

8/16

65°

```
LINE WIDTH = 16.00

THIS GIVES AN AVERAGE RELATIVE LINE WIDTH OF 18.77
32 GOOD DATA SAMPLES WERE TAKEN.
```

UUT PROGRAM: XBOR2.IC COMPILED ON: 16-AUG-83 8:12:52
TESTED: 8/16/83 10:2:52 USING SYSTEM TADS/PNVS 4

JSM
DRM

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

Boresight

65°

WARNING, 10488 MESSAGE: 40

LEFT COLUMN VECTOR

133 132 133 130 134 136 134 134 133 131 134 131 134 132 132
132 135 134 132 131 132 130 133 126 129 133 133 137 135 133
135 130 133 130 134 131 132 131 136 133 133 130 130 134 130
136 136 133 131 132 135 134 136 138 131 132 133 133 131 133
138 129 132 136 136 131 137 134 135 135 134 138 138 136 142
146 153 166 187 190 194 173 160 146 146 142 139 141 136 139
137 134 132 131 134 135 135 136 133 134

RIGHT COLUMN VECTOR

139 139 140 135 135 137 135 137 135 132 135 136 138 136 134
136 136 134 135 136 138 138 139 133 136 134 135 137 135 136
137 136 134 133 134 134 136 136 135 136 137 136 137 136 136
135 137 136 137 135 135 137 138 137 138 135 136 135 140 136
136 134 136 136 134 137 139 136 135 137 137 140 136 142 147
144 152 164 184 193 168 184 164 151 146 146 142 144 138 140
138 138 134 135 141 136 136 138 134 136

UPPER ROW VECTOR

133 132 134 133 132 130 133 132 134 134 132 131 135 133 135
135 136 135 133 132 137 137 136 135 136 132 137 134 138 135
137 136 138 138 137 136 139 138 138 138 138 137 137 137 139
138 136 137 139 139 144 148 157 173 183 189 178 164 153 142
143 139 136 135 138 135 139 136 139 137 137 136 137 135 140
139 139 139 139 139

LOWER ROW VECTOR

137 136 135 134 133 133 135 134 136 135 134 131 136 133 137
136 135 133 135 134 136 135 136 134 138 136 139 141 137 137
135 133 137 137 137 135 138 136 138 138 141 138 138 136 139
140 142 141 141 141 143 147 160 177 183 186 175 160 149 143
141 138 140 135 142 140 138 136 138 138 136 137 140 138 142
139 140 138 140 138
CROSS1= 78.7 CROSS2= 81.7
DIFFERENCE= 1.5
THE LEFT COLUMN VECTOR CROSSED THE TARGET LINE AT 19.8
CROSS1= 78.8 CROSS2= 82.2
DIFFERENCE= 1.7
THE RIGHT COLUMN VECTOR CROSSED THE TARGET LINE AT 19.5
CROSS1= 54.7 CROSS2= 56.8
DIFFERENCE= 1.1
THE UPPER ROW VECTOR CROSSED THE TARGET LINE AT 55.8
CROSS1= 54.5 CROSS2= 56.5

DIFFERENCE= 1.0
CENTER IS AT 55.5
THE LOWER ROW VECTOR CROSSED THE TARGET LINE AT 55.5
THE HORIZONTAL CROSSHAIR HAS A SLOPE OF -0.0
THE VERTICAL CROSSHAIR HAS A SLOPE OF 406.2
THE CROSSHAIRS INTERSECT AT 55.6 19.6

LEFT COLUMN VECTOR

```
 134 134 132 137 134 135 136 132 132 133 130 134 133 132 134
 134 137 131 133 136 135 135 133 131 133 132 134 134 132 132
 132 132 134 132 134 131 136 132 134 134 135 130 134 132 132
 132 138 135 136 135 135 134 134 135 130 133 134 139 131 132
 134 134 137 137 133 134 136 132 136 137 138 138 140 141 143
 146 154 174 188 190 191 172 159 148 144 141 142 138 139 138
 139 138 134 135 135 133 137 134 133 134
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RIGHT COLUMN VECTOR

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 139 133 140 137 136 136 137 134 136 137 137 137 134 136 138
 136 135 135 134 137 140 134 137 137 136 135 137 135 137 134
 136 135 138 132 134 138 136 136 135 135 134 137 141 133 134
 134 140 134 138 137 135 137 136 137 138 138 137 138 138 137
 137 135 139 137 138 136 137 138 137 139 140 140 140 140 146
 146 156 166 185 191 196 176 164 151 146 143 142 143 142 140
 140 140 138 138 138 140 137 139 138 139
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UPPER ROW VECTOR

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 134 134 135 135 135 134 134 132 135 135 134 133 135 134 136
 134 135 135 136 135 137 135 138 136 137 135 136 135 137 134
 136 137 138 138 136 135 137 137 138 137 139 138 136 135 137
 137 140 138 142 144 142 147 156 173 180 187 181 167 155 144
 142 139 142 139 140 136 139 138 138 138 138 136 136 135 139
 138 134 133 134 133
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LOWER ROW VECTOR

```
 137 134 134 133 133 132 136 135 136 133 138 137 139 139 138
 135 139 137 139 139 139 137 137 136 140 138 137 139 138 138
 139 137 138 137 137 136 137 136 139 138 138 137 138 136 141
 139 141 140 141 139 147 151 160 176 184 187 176 163 151 144
 145 142 142 137 138 136 140 139 140 137 138 136 141 139 140
 139 140 139 140 139
```

CROSS1= 78.4 CROSS2= 81.6
DIFFERENCE= 1.6
THE LEFT COLUMN VECTOR CROSSED THE TARGET LINE AT 20.0
CROSS1= 78.7 CROSS2= 81.8
DIFFERENCE= 1.5
THE RIGHT COLUMN VECTOR CROSSED THE TARGET LINE AT 19.7
CROSS1= 55.0 CROSS2= 57.1
DIFFERENCE= 1.0
THE UPPER ROW VECTOR CROSSED THE TARGET LINE AT 56.0
CROSS1= 54.5 CROSS2= 56.8
DIFFERENCE= 1.1
CENTER IS AT 55.6
THE LOWER ROW VECTOR CROSSED THE TARGET LINE AT 55.6
THE HORIZONTAL CROSSHAIR HAS A SLOPE OF -0.0
THE VERTICAL CROSSHAIR HAS A SLOPE OF 241.9
THE CROSSHAIRS INTERSECT AT 55.7 19.8

LEFT COLUMN VECTOR

```
 132 130 139 132 137 133 136 131 135 129 134 132 135 131 134
 134 135 128 134 133 134 134 130 134 135 131 133 135 132 132
 134 135 132 133 135 134 135 133 136 134 136 137 134 132 135
 133 136 135 136 137 134 133 132 137 133 128 133 134 134 134
 134 134 134 136 134 134 136 135 137 133 136 137 138 140 143
 148 157 171 184 191 188 179 161 152 147 142 141 141 137 135
 136 135 138 134 134 135 134 135 135 133

RIGHT COLUMN VECTOR

 137 137 135 137 138 135 137 136 136 134 137 134 137 137 136
 134 137 136 139 139 136 135 138 138 137 137 136 139 138 138
 138 135 134 136 138 137 135 135 137 138 133 135 136 136 133
 135 136 136 137 137 137 135 135 139 138 135 136 137 137 137
 140 136 135 137 137 136 136 134 137 138 139 140 141 139 145
 143 151 166 182 192 189 185 166 155 147 145 145 138 140 140
 138 140 137 141 142 136 137 138 137 135

UPPER ROW VECTOR

 132 130 132 131 134 134 134 132 136 134 136 135 137 135 138
 136 136 134 134 134 136 132 138 135 136 133 132 133 137 134
 138 135 137 136 136 134 138 137 139 136 137 135 135 134 136
 134 137 137 140 141 143 146 153 171 181 189 181 167 158 148
 143 139 141 138 140 137 140 138 138 136 138 137 137 136 137
 136 137 137 137 137

LOWER ROW VECTOR

 135 135 137 137 138 138 138 136 137 136 137 137 136 137 137
 134 137 135 139 137 137 135 137 135 138 136 138 140 140 140
 139 136 137 136 138 136 138 136 137 137 137 136 138 137 137
 139 137 138 141 140 146 149 157 174 181 187 179 165 153 145
 143 141 140 137 139 137 138 136 139 137 139 138 138 137 138
 138 138 138 138 138
CROSS1= 78.7 CROSS2= 81.9
DIFFERENCE= 1.6
THE LEFT COLUMN VECTOR CROSSED THE TARGET LINE AT 19.7
CROSS1= 78.9 CROSS2= 82.3
DIFFERENCE= 1.7
THE RIGHT COLUMN VECTOR CROSSED THE TARGET LINE AT 19.4
CROSS1= 54.9 CROSS2= 57.1
DIFFERENCE= 1.1
THE UPPER ROW VECTOR CROSSED THE TARGET LINE AT 56.0
CROSS1= 54.9 CROSS2= 56.9
DIFFERENCE= 1.0
CENTER IS AT 55.9
THE LOWER ROW VECTOR CROSSED THE TARGET LINE AT 55.9
THE HORIZONTAL CROSSHAIR HAS A SLOPE OF  -0.0
THE VERTICAL CROSSHAIR HAS A SLOPE OF 802.3
THE CROSSHAIRS INTERSECT AT 55.9 19.5
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DUT PROGRAM: LINWID2.1C COMPILED ON: 17-AUG-83 8:16:34
TESTED: 8/17/83 8:51:22 USING SYSTEM TADS/PNVS 4

- RUN TIME SYSTEM REV 7.07 --DGL 2.10 13-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

LINE WIDTH = 12.67

LINE WIDTH = 20.03

LINE WIDTH = 18.57

LINE WIDTH = 18.32

LINE WIDTH = 18.72

LINE WIDTH = 18.82

LINE WIDTH = 17.97

LINE WIDTH = 19.12

LINE WIDTH = 18.34

LINE WIDTH = 17.97

LINE WIDTH = 18.90

LINE WIDTH = 18.19

LINE WIDTH = 19.09

THIS GIVES AN AVERAGE RELATIVE LINE WIDTH OF 18.21
13 GOOD DATA SAMPLES WERE TAKEN.

Focus
Home Position
High Temp

LINE WIDTH = 19.36

LINE WIDTH = 19.35

LINE WIDTH = 19.42

LINE WIDTH = 18.55

LINE WIDTH = 18.22

LINE WIDTH = 19.15

LINE WIDTH = 18.63

LINE WIDTH = 19.10

LINE WIDTH = 18.52

LINE WIDTH = 18.63

LINE WIDTH = 19.03

LINE WIDTH = 19.39

LINE WIDTH = 18.75

LINE WIDTH = 18.84

LINE WIDTH = 18.60

LINE WIDTH = 18.62

LINE WIDTH = 19.37

LINE WIDTH = 18.42

LINE WIDTH = 18.36

LINE WIDTH = 19.28

LINE WIDTH = 18.82

LINE WIDTH = 18.45

LINE WIDTH = 18.41

LINE WIDTH = 18.64

LINE WIDTH = 19.44

LINE WIDTH = 18.81

LINE WIDTH = 18.79

LINE WIDTH = 19.43

LINE WIDTH = 18.77

LINE WIDTH = 19.47

8/17/83

Focus
Home Position
High temp.

THIS GIVES AN AVERAGE RELATIVE LINE WIDTH OF 18.89
30 GOOD DATA SAMPLES WERE TAKEN.

LINE WIDTH = 19.60

LINE WIDTH = 19.80

LINE WIDTH = 19.64

LINE WIDTH = 20.35

LINE WIDTH = 19.60

LINE WIDTH = 19.66

LINE WIDTH = 19.50

LINE WIDTH = 18.74

LINE WIDTH = 18.58

LINE WIDTH = 18.91

LINE WIDTH = 20.25

LINE WIDTH = 19.29

LINE WIDTH = 19.36

LINE WIDTH = 18.71

LINE WIDTH = 18.78

LINE WIDTH = 19.00

THIS GIVES AN AVERAGE RELATIVE LINE WIDTH OF 19.36
16 GOOD DATA SAMPLES WERE TAKEN.

~~WARNING, 10488 MESSAGE: 40~~

~~WARNING, 10488 MESSAGE: 40~~

~~WARNING, 10488 MESSAGE: 40~~

~~WARNING, 10488 MESSAGE: 40~~

~~WARNING, 803 INVALID STARTING TEST STEP~~

~~LINE WIDTH = 15.21~~

Focus
Home Position
High temp.

8/17/83

UUT PROGRAM: XBOR2.IC   COMPILED ON: 16-AUG-83 8:12:52
TESTED: 8/17/83 10:26:24   USING SYSTEM TADS/PNVS 4

- REAL TIME SYSTEM REV 7.07 --DGL 2.10 15-AUG-82
PROGRAM COMPILED USING ATLAS REVISION: 6.07

C A L I B R A T I O N   S T A T U S
** ORIGINAL SYSTEM CAL APPLIED
** MEAS CAL APPLIED
** STIM CAL APPLIED
NO RF STATION CAL APPLIED

Focus = Home
Hot
Boresight

LEFT COLUMN VECTOR

135 134 137 135 135 136 137 134 135 135 135 136 134 134 135
134 135 135 135 132 136 131 136 133 136 134 134 135 134 134
133 136 134 133 138 137 137 137 137 137 136 135 135 138 134
136 136 135 136 135 134 136 135 136 136 134 136 136 137 137
135 139 142 144 154 165 174 195 196 191 180 158 147 144 140
139 136 136 135 136 139 136 138 138 135 135 137 136 136 133
135 135 136 135 136 135 135 133 137 138

RIGHT COLUMN VECTOR

137 134 142 136 136 135 139 137 140 141 138 138 140 137 139
137 139 136 139 139 140 139 137 135 141 136 136 138 138 136
138 136 136 137 137 139 138 136 135 137 139 137 140 138 137
137 137 139 137 141 141 139 136 137 140 139 138 137 140 139
140 137 142 146 149 160 173 189 195 193 179 164 151 144 148
143 140 139 140 140 141 137 140 136 137 137 140 137 139 137
138 139 136 140 138 136 140 140 139 139

UPPER ROW VECTOR

136 134 137 134 137 134 137 134 136 134 137 135 138 135 138
136 137 136 138 137 138 136 138 137 139 137 136 136 138 136
136 138 139 136 136 135 139 136 138 135 139 137 138 137 141
140 142 144 150 168 179 192 187 173 161 146 142 136 140 139
140 138 137 136 141 136 139 136 136 136 139 138 138 136 138
135 138 134 138 134

LOWER ROW VECTOR

135 135 135 133 137 137 136 135 138 137 139 137 139 138 136
134 136 134 138 137 139 137 140 136 139 138 139 139 140 140
140 137 140 138 136 137 140 138 139 136 139 138 141 139 142
142 145 146 157 175 183 193 186 169 159 145 142 136 140 139
139 137 139 136 136 134 136 134 138 136 141 138 140 138 138
136 140 140 140 140
CROSS1= 67.5 CROSS2= 71.0
DIFFERENCE= 1.9
THE LEFT COLUMN VECTOR CROSSED THE TARGET LINE AT 30.9
CROSS1= 67.4 CROSS2= 70.9
DIFFERENCE= 1.7
THE RIGHT COLUMN VECTOR CROSSED THE TARGET LINE AT 30.8
CROSS1= 51.1 CROSS2= 53.5
DIFFERENCE= 1.2
THE UPPER ROW VECTOR CROSSED THE TARGET LINE AT 52.3
CROSS1= 50.6 CROSS2= 53.4
DIFFERENCE= 1.4
CENTER IS AT 52.0

THE LOWER ROW VECTOR CROSSED THE TARGET LINE AT 52.0
THE HORIZONTAL CROSSHAIR HAS A SLOPE OF -0.0
THE VERTICAL CROSSHAIR HAS A SLOPE OF 320.5
THE CROSSHAIRS INTERSECT AT 52.1 30.8

LEFT COLUMN VECTOR

140 134 134 135 135 139 136 136 134 134 135 139 134 134 137
137 134 135 138 134 136 134 134 136 132 135 135 137 134 138
139 135 136 140 134 136 134 137 134 138 137 134 132 135 135
134 135 137 135 136 136 135 136 135 136 137 139 138 135 137
138 137 142 141 145 153 163 177 189 197 190 179 158 152 146
142 141 140 139 139 137 137 136 138 137 136 136 139 135 137
138 137 135 137 134 135 135 135 138 135

RIGHT COLUMN VECTOR

136 136 138 140 137 136 136 139 139 140 138 136 139 139 137
138 138 138 137 139 136 140 135 142 140 139 138 139 135 137
136 137 139 139 138 137 139 138 138 139 139 139 139 140 135
140 138 138 138 136 140 140 138 139 137 138 138 139 138 140
139 142 139 141 146 155 158 170 196 196 196 164 167 155 148
145 141 140 141 141 141 143 138 141 140 139 137 139 138 140
139 138 139 140 140 140 139 139 142 138

UPPER ROW VECTOR

137 134 135 132 138 136 138 138 140 139 140 136 138 137 139
138 142 139 140 138 140 137 139 137 139 136 139 138 139 136
141 138 140 140 142 140 141 139 142 141 141 140 140 137 140
140 143 144 152 165 180 190 189 176 162 145 146 141 147 141
144 141 141 139 140 138 140 137 140 139 139 135 137 137 138
136 140 136 140 136

LOWER ROW VECTOR

137 135 139 138 139 138 137 136 140 138 139 137 139 137 138
136 138 137 139 139 140 140 140 139 140 139 140 138 140 140
140 139 141 139 139 137 137 136 138 137 140 140 142 142 142
144 145 148 155 172 183 192 189 174 159 146 144 141 139 140
142 141 143 142 144 141 143 142 143 142 140 139 142 142 141
140 140 139 140 139
CROSS1= 68.3 CROSS2= 71.9
DIFFERENCE= 1.8
THE LEFT COLUMN VECTOR CROSSED THE TARGET LINE AT 29.9
CROSS1= 68.4 CROSS2= 72.2
DIFFERENCE= 1.9
THE RIGHT COLUMN VECTOR CROSSED THE TARGET LINE AT 29.7
CROSS1= 51.0 CROSS2= 53.7
DIFFERENCE= 1.3
THE UPPER ROW VECTOR CROSSED THE TARGET LINE AT 52.3
CROSS1= 50.7 CROSS2= 53.6
DIFFERENCE= 1.4
CENTER IS AT 52.2
THE LOWER ROW VECTOR CROSSED THE TARGET LINE AT 52.2
THE HORIZONTAL CROSSHAIR HAS A SLOPE OF -0.0
THE VERTICAL CROSSHAIR HAS A SLOPE OF 526.0
THE CROSSHAIRS INTERSECT AT 52.2 29.8

LEFT COLUMN VECTOR

137 136 136 133 133 134 136 135 139 138 136 139 133 135 134
137 135 134 138 133 135 134 130 132 134 137 135 135 137 138

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 138 136 135 137 134 134 135 132 137 137 135 136 136 139 135
 137 132 135 135 137 135 137 136 137 136 137 134 138 135 137
 140 139 136 142 145 150 166 180 170 207 177 176 164 149 145
 128 139 140 139 139 140 137 136 137 139 138 137 136 137 136
 137 135 136 134 139 141 134 135 136 136

RIGHT COLUMN VECTOR

 139 138 138 139 139 138 139 138 140 138 141 139 136 138 139
 140 138 139 139 140 139 142 139 139 140 139 137 138 143 138
 142 140 137 137 136 140 140 138 141 136 138 140 138 143 137
 138 136 140 138 138 138 139 142 136 136 141 138 139 138 139
 141 141 140 141 145 155 160 173 186 197 194 185 166 156 148
 144 143 141 140 142 140 142 140 138 139 139 139 139 140 139
 139 139 136 140 140 141 137 139 139 140

UPPER ROW VECTOR

 139 136 139 136 138 136 138 137 139 138 139 138 139 138 141
 140 139 136 138 137 140 137 140 138 139 137 140 138 141 140
 141 138 140 139 141 141 140 137 139 138 140 140 141 139 142
 139 144 144 152 166 179 168 169 175 163 147 145 140 141 138
 142 139 142 141 141 139 141 135 139 137 139 136 138 137 139
 137 140 138 140 138

LOWER ROW VECTOR

 136 135 136 136 137 136 137 138 139 139 141 138 141 137 139
 137 138 139 139 138 139 139 140 139 140 139 140 140 139 140
 139 141 141 141 143 140 143 140 140 140 141 141 142 129 143
 149 144 156 156 162 184 204 189 164 161 157 143 142 143 141
 143 141 143 140 141 140 142 142 142 142 143 142 144 138 142
 139 141 139 140 138
CROSS1= 68.0 CROSS2= 70.9
DIFFERENCE= 1.5
THE LEFT COLUMN VECTOR CROSSED THE TARGET LINE AT 30.6
CROSS1= 68.5 CROSS2= 72.3
DIFFERENCE= 1.9
THE RIGHT COLUMN VECTOR CROSSED THE TARGET LINE AT 29.6
CROSS1= 51.1 CROSS2= 53.6
DIFFERENCE= 1.3
THE UPPER ROW VECTOR CROSSED THE TARGET LINE AT 52.4
CROSS1= 50.8 CROSS2= 53.4
DIFFERENCE= 1.3
CENTER IS AT 52.1
THE LOWER ROW VECTOR CROSSED THE TARGET LINE AT 52.1
THE HORIZONTAL CROSSHAIR HAS A SLOPE OF  -0.0
THE VERTICAL CROSSHAIR HAS A SLOPE OF 333.4
THE CROSSHAIRS INTERSECT AT 52.2 29.9

SEVERE ERROR, HARDWARE SHUTDOWN DUE TO OPERATOR ABORT.
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APPENDIX A-7

APPLICABLE MARS TAGS

MARTIN MARIETTA

MARS MATERIAL REVIEW

MARS DOCUMENT NUMBER

1. WORK ORDER/EDIT CODE	2. DASH	3. PF	4. FILE	5. STA	6. TYPE	7. ACCT NO	8. GFE	9. ORIGINATOR'S NAME	10. O-DATE
3TL1498		EZ	A	342	R	784	Y	T Randich	83091

11. PART NUMBER NEXT ASSEMBLY	12. PART NAME NEXT ASSEMBLY	13. REF DOC/P.O. NO./VENDOR NAME	14. E.I.	15. E.I. S/N
~~[illegible]~~				

16. PART NUMBER INSPECTED/TESTED	17. S/N INSP TEST	18. PART NAME INSPECTED/TESTED	19. QTY I/T	20. DEFTV	21. REJ	22. LOT
13082808-19	00003	EO Bench	1	1	1	

23. ITEM	24. PART NUMBER FAILED	25. S/N FAILED	26. REF DESIGNATION	27. PART NAME FAILED	28. RUN TIME
1	13082795	00004		Center Section	

29. QTY PARTS: 1
30. QTY DEFECTS: 1
31. CODE: 350 32. S: 3
33. MPP REV:
34. STEP COMP:
35. STEP FAIL:
36. CAUSE CODE: m
37. DEPT RESP: 5300
38. C/A CODE: D
39. CAE BADGE: 26633

40. DEFECT DESCRIPTION

1.) VSG Failed ATP Test 4.1.10, Cam. Sync Pulled board to monitor synch signals and found them good. Reinserted board. ReRan Test and Passed ATP. problem related to Mars Tag 3TL1472 which states Intermitent problems with PPG.

41. QUALITY SUPERVISOR

42. REWORK
DATE
43. RETEST
DATE
44. QUALITY
DATE

45. CORRECTIVE ACTION

46. FLOOR DISPOSITION	.1 RWK	.2 SCRAP	.3 RTV	.4 MRB	.5 STANDARD REPAIR	47. MFG ENGINEER/SUPERVISOR	48. QUALITY ENG
				4 MRB		J. Munday	

23. ITEM	24. PART NUMBER FAILED	25. S/N FAILED	26. REF DESIGNATION	27. PART NAME FAILED	28. RUN TIME
2	13082701-19	00003		Electronics Stat.	

29. QTY PARTS: 1
30. QTY DEFECTS: 1
31. CODE: 350 32. S: 3
33. MPP REV:
34. STEP COMP:
35. STEP FAIL:
36. CAUSE CODE: m
37. DEPT RESP: 5300
38. C/A CODE: D
39. CAE BADGE: 26633

40. DEFECT DESCRIPTION

1) PMT Controller/Cooler Failed ATP Test 4.2.4 Readjusted Coldness setting on back of PMT Controller, Reran ATP Test 4.2.4. Test Passed.

41. QUALITY SUPERVISOR

42. REWORK
DATE
43. RETEST
DATE
44. QUALITY
DATE

45. CORRECTIVE ACTION

46. FLOOR DISPOSITION	1 RWK	.2 SCRAP	.3 RTV	.4 MRB	.5 STANDARD REPAIR	47. MFG ENGINEER/SUPERVISOR	48. QUALITY ENG
						J. Munday	

49. QTY	TO BE MRB DISP'D	51. DISPOSITION INSTRUCTIONS	52. PRELIMINARY AUTHORIZATION	53. DATE
50. QTY	REWORK		54. ENGINEERING MRB	
	REPAIR		55. QUALITY MRB	
	UAI		56. CUSTOMER MRB	
	RTV		57. RFW NO. P A D	
	SCRAP		58. MFG MANAGER	59. COST

60. PAGE 1 OF 1

FORM 2360 Mar 83

MARS DOCUMENT NUMBER

MARS MATERIAL REVIEW

MARTIN MARIETTA

1. WORK ORDER EDIT CODE	2. DASH	3. PF	4. FILE	5. STA	6. TYPE	7. ACCT NO.	8. GFE	9. ORIGINATOR'S NAME	10. O-DATE
3TZ1495		EZ	A	342		784	Y	R. LYNN	830817

11. PART NUMBER NEXT ASSEMBLY	12. PART NAME NEXT ASSEMBLY	13. REF DOC/P.O. NO./VENDOR NAME	14. E.I.	15. E.I. S/N
			TTCA	00003

16. PART NUMBER INSPECTED/TESTED	17. S/N INSP TEST	18. PART NAME INSPECTED/TESTED	19. QTY I/T	20. DEFTV	21. REJ	22. LOT
13082808-19	00003	EO BENCH	1	1	1	

23. ITEM	24. PART NUMBER FAILED	25. S/N FAILED	26. REF DESIGNATION	27. PART NAME FAILED	28. RUN TIME
1	13081866	—	—	CABLE ASSY	

29. QTY PARTS: 1
30. QTY DEFECTS: 1
31. CODE: 769 32. S: 3
33. MPP REV
34. STEP COMP
35. STEP FAIL
36. CAUSE CODE: E
37. DEPT RESP: 6122
38. C/A CODE: M
39. CAE BADGE: 26633

40. DEFECT DESCRIPTION

DRF 345 POWER SUPPLY FAILED - DISCONNECT P1 TO CONTINUE TEMP TEST

GFE First Item.

41. QUALITY SUPERVISOR

42. REWORK — DATE
43. RETEST — DATE
44. QUALITY — DATE

45. CORRECTIVE ACTION

VENDOR HAS A DESIGN PROBLEM. AT LEAST 1 CAPACITOR IS REVERSED. MMC IS ASKING HIM TO FIX ~~THIS~~ PROBLEM.

46. FLOOR DISPOSITION: 1 RWK | 2 SCRAP | 3 RTV | 4 MRB | 5 STANDARD REPAIR

47. MFG ENGINEER/SUPERVISOR: J. Munday

48. QUALITY ENG

23. ITEM	24. PART NUMBER FAILED	25. S/N FAILED	26. REF DESIGNATION	27. PART NAME FAILED	28. RUN TIME

29. QTY PARTS
30. QTY DEFECTS
31. CODE 32 S
33. MPP REV
34. STEP COMP
35. STEP FAIL
36. CAUSE CODE
37. DEPT RESP
38. C/A CODE
39. CAE BADGE

40. DEFECT DESCRIPTION

41. QUALITY SUPERVISOR

42. REWORK — DATE
43. RETEST — DATE
44. QUALITY — DATE

45. CORRECTIVE ACTION

46. FLOOR DISPOSITION: 1 RWK | 2 SCRAP | 3 RTV | 4 MRB | 5 STANDARD REPAIR

47. MFG ENGINEER/SUPERVISOR

48. QUALITY ENG

49. QTY | TO BE MRB DISP'D
50. QTY: REWORK / REPAIR / UAI / RTV / SCRAP

51. DISPOSITION INSTRUCTIONS

REPAIR ENG UNIT SN 12667(66) BY INSTALLING REVERSED CAP CORRECTLY. INSTALL THIS UNIT TO CONTINUE TEST. UNIT TO BE REPLACED WHEN A QUALITY SUPPLY IS AVAILABLE.

52. PRELIMINARY AUTHORIZATION — 53. DATE
54. ENGINEERING MRB: J. Munday — 830817
55. QUALITY MRB
56. CUSTOMER MRB
57. RFW NO. P A D
58. MFG MANAGER
59. COST

60. PAGE 1 OF 1

FORM 2360 Mar 83

MARTIN MARIETTA

MARS MATERIAL REVIEW

MARS DOCUMENT NUMBER

1. WORK ORDER EDIT CODE	2. DASH	3. PF	4. FILE	5. STA	6. TYPE	7. ACCT NO.	8. GFE	9. ORIGINATOR'S NAME	10. C DATE
3TL1496		EZ	A	342	R	784	Y	T. Randich	830816

11. PART NUMBER NEXT ASSEMBLY	12. PART NAME NEXT ASSEMBLY	13. REF DOC/P.O. NO./VENDOR NAME	14. E.I.	15. E.I. S/N
			T/CA	00003

16. PART NUMBER INSPECTED/TESTED	17. S/N INSP TEST	18. PART NAME INSPECTED/TESTED	19. QTY I/T	20. DEFTV	21. REJ	22. LOT
13082808-19	00003	EO Bench	1	1	1	

23. ITEM	24. PART NUMBER FAILED	25. S/N FAILED	26. REF DESIGNATION	27. PART NAME FAILED	28. RUN TIME
1	13082795	00004		Cent Sect.	

29. QTY PARTS: 1
30. QTY DEFECTS: 1
31. CODE: 350 32. S: 3
33. MPP REV
34. STEP COMP
35. STEP FAIL
36. CAUSE CODE: M
37. DEPT RESP: 5300
38. C/A CODE: D
39. CAE BADGE: 26633

40. DEFECT DESCRIPTION

1.) Digitizer failed ATP Section 41.5 due to operator misconnecting cable 79906184-P2 to major adaptor J2.

JM

41. QUALITY SUPERVISOR

42. REWORK

DATE

43. RETEST: JM 830818

DATE

44. QUALITY

DATE

45. CORRECTIVE ACTION

46. FLOOR DISPOSITION: 1 RWK | 2 SCRAP | 3 RTV | 4 MRB | 5 STANDARD REPAIR

47. MFG ENGINEER/SUPERVISOR: J. Munday

48. QUALITY ENG

23. ITEM	24. PART NUMBER FAILED	25. S/N FAILED	26. REF DESIGNATION	27. PART NAME FAILED	28. RUN TIME
2	13082795	00004		Center Section	

29. QTY PARTS: 1
30. QTY DEFECTS: 1
31. CODE: 350 32. S: 3
33. MPP REV
34. STEP COMP
35. STEP FAIL
36. CAUSE CODE: M
37. DEPT RESP: 5300
38. C/A CODE: D
39. CAE BADGE: 26633

40. DEFECT DESCRIPTION

2.) Resolver Simulator failed ATP Section 4.1.8 Reran Test Two times and passed ATP Section 4.1.8 each time. Failure due to Equate Missed Measurement. Retest passed ATP Section 4.1.8 per ATP section 3.8, #13082803 Rev L.

JM

41. QUALITY SUPERVISOR

42. REWORK

DATE

43. RETEST: JM 830818

DATE

44. QUALITY

DATE

45. CORRECTIVE ACTION

46. FLOOR DISPOSITION: 1 RWK | 2 SCRAP | 3 RTV | 4 MRB | 5 STANDARD REPAIR

47. MFG ENGINEER/SUPERVISOR: J. Munday

48. QUALITY ENG

49. QTY	TO BE MRB DISP'D	51. DISPOSITION INSTRUCTIONS	52. PRELIMINARY AUTHORIZATION	53. DATE
50. QTY	REWORK	None avg hardware OK	54. ENGINEERING MRB: J. Munday	830818
	REPAIR		55. QUALITY MRB	
	UAI		56. CUSTOMER MRB	
	RTV		57. RFW NO. P / A / D	
	SCRAP		58. MFG MANAGER	59. COST

60. PAGE 1 OF

FORM 2360 Mar 83

MARS SUPPLEMENTAL DATA

MARS REPORT NO. 3TL1496

INDEX CODE (1–7)	IFC (8)	MARS NUMBER (9–15)	TR (16)	PART NO. 13082808-19	PAGE 2 OF

17 18 19

3) The Mars Tags are listed below which are open as of todays date against the augmentation used in the temp test:

3TL0267
3TL1434
3TL 1286
3TL 1450
3TL 1472
3TL 1465
3TL 1491

See Attached List for Mars Tag description.

REPORTED BY	DATE	QUALITY SUPERVISOR	DATE	ENGINEERING MRB	DATE
ASSOC. CONTRACTOR/CUSTOMER/VERIFIED		QUALITY MRB	DATE	CUSTOMER REP.	DATE

FORM 2313
MAY67

OPEN MARS LOGS
DURING TEMPERATURE LIST RUN

E	3TL 0267	Elect drawer open for connecting video monitor.
E	3TL 1434	CID Camera Controller to be removed for test. Has not been.
E	3TL 1286	Laser shield pin sheared. Has been fixed.
E	3TL 1450	Digitizer plug in failure. Has not been fixed. We are using a unit.
E	3TL 1472	PPG pulse width test failed during ATP tool sell off. Problem has not returned. Log is open pending more tests.
Q	3TL 1465	Laser simulator power supply failed. Supply is fixed is open. Quality .
E	3TL 1491	CID Camera Cable failure.

END

FILMED

11-83

DTIC